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Original Research Paper

Ophthalmology

CLINICAL PROFILE AND FACTORS AFFECTING THE FINAL VISUAL OUTCOME OF OCULAR TRAUMA PATIENTS IN A TERTIARY CARE CENTRE OF NORTH INDIA

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ABSTRACT

Ocular trauma constitutes an important cause of monocular visual impairment and preventable blindness worldwide.

Objectives: To study the clinical profile and factors affecting the final visual outcome of ocular trauma patients.

Material & Methods: A prospective, hospital based, interventional study was conducted in 200 patients of ocular trauma attending emergency services and OPD in Regional Institute of Ophthalmology, PGIMS Rohtak, Haryana, India. Different pre-operative variables were reviewed and analysed with the final visual outcome.

Results: The most common age group involved was 21-30 years with significant male preponderance. Closed globe injuries were more common and seen in 81% cases while open globe injuries were seen in 19% cases only. Most common close and open globe injury was contusion (37%) and penetrating injuries (9%) respectively. Among open globe injury, zone I was most commonly involved in 70% cases followed by zone II in 20% and zone III in 10% cases. Stepwise multiple linear regression analysis was done and predictors for final visual outcome were found to be presenting visual acuity, size of corneal tear, time of presentation, type of injury, zone of injury and OTS. All these variables were statistically significant ($p < 0.05$) on Chi-square test.

Conclusion: Poor initial Visual Acuity, late presentation, large corneal tear and posterior segment involvement adversely affect the final visual outcome after ocular trauma. Early referral, prompt evaluation and treatment can reduce the sight threatening complications as well as salvage the eye, both anatomically and functionally.

KEYWORDS : Ocular trauma, open globe injury, closed globe injury, visual outcome.

INTRODUCTION

Ocular trauma is one of the most common cause of ophthalmic morbidity and preventable monocular blindness worldwide. The eye represents only 0.27% of the total body surface area but it is the third most common organ affected by trauma.[1] According to WHO, global annual incidence of ocular trauma is around 55 million leading to huge socio-economic impact.[2] Trauma is the most important cause of unilateral loss of vision, particularly in developing countries accounting for 1.37% of overall blindness.[3]

Blindness is a major issue in developing countries like India and main cause of uniocular blindness is ocular trauma. Out of all types of ocular emergencies, ocular trauma is by far the commonest, constituting nearly 75% of all ocular emergencies.[4] Ocular injuries mostly affect young population and therefore, ocular injuries assume immense socioeconomic importance involving great loss of human socioeconomic efficiency and monetary loss.

Ocular trauma is an avoidable cause of blindness and visual impairment. According to estimates by WHO, 750,000 cases require hospitalization which includes 200,000 open globe injuries. Until recently, ocular trauma was a neglected issue and it is highlighted as a major cause of visual morbidity more recently.[5]

In India, burden of ocular trauma is significant because of lack of awareness, poor safety measures and late presentation. More than 50 million blind people are blind and this number increases by about 3.8 million per year in India. Amongst the total number of blind cases, 1.2% is contributed by injuries which are preventable.[6] Approximately 75% of the population suffering from ocular trauma are monocular blind.[7] One out of twenty patients presenting to the ophthalmologist has an ocular injury.[8] The age distribution of occurrence of serious ocular trauma is bimodal with the maximum incidence in young adults (first 3 decades), peak incidence at 21 years and a second peak in the elderly.[9] Nearly 90% of eye injuries can be prevented by relatively simple measures.[10]

There is limited data available on clinical profile and factors predicting the visual outcome in ocular trauma cases in India. Therefore, we conducted this study to determine clinical profile and factors determining the final visual outcome in ocular trauma patients attending tertiary eye care centre of North India.

MATERIAL & METHODS

A prospective, hospital based, interventional study was conducted in a tertiary eye care centre of north India after taking ethical clearance from Institutional Ethics Committee.

Sample Size:

200 patients of ocular trauma attending emergency and OPD of Regional Institute of Ophthalmology PGIMS, Rohtak were included in the study and the sample size (n) was calculated using the following formula:

Sample size $(n) = (Z_{1-\alpha/2})^2 (p) (q) / (d)^2$

$(Z_{1-\alpha/2})$ = critical value and a standard value for the corresponding level of confidence

For 95% CI , it is 1.96

p= Expected prevalence which is 15% for ocular trauma from general population in India

q= 1-p

d= Margin of error

For our study, at 95% CI, 80% power of study and 5% margin of error sample size will be

$n = (1.96)^2 (0.15) (0.85) / (0.05)^2$

$= 195.92$

Which was rounded off to 200.

Exclusion Criteria:

Patients with any kind of birth injury or congenital ocular defect causing visual deficits were excluded. All patients with any kind of thermal injuries, chemical injuries, ultrasonic injuries and radiation injuries were excluded.

200 patients of ocular injuries were enrolled in our study after taking an informed consent. At initial visit, identity of each patient was recorded including hospital registration number, name of patient, address, age, sex, occupation and education

of patient. All enrolled patients were categorized into low, middle and high socioeconomic status. Then a detailed history was recorded, particular attention being paid to activity in which patient was engaged at the time of injury, mechanism of injury, pre-existing ocular status, time between injury and first presentation to eye department and reason for late presentation. A thorough ocular examination was conducted in all patients which included visual acuity, pupillary reflexes, detailed slit lamp examination and fundus examination. Then ocular injury was classified as per BETT's classification.[11] B-scan, X-ray and computed tomography scan were done whenever necessary. Patients were followed up on day 1, day 7, 1st month and at 6th month. Final best-corrected visual acuity (BCVA) was evaluated after 6 months and recorded in LogMAR units for statistical correlation.

Data was collected, tabulated and statistical analyses were performed using Statistical Package for the Social Sciences software (Version SPSS 21.0/ IBM, Chicago, USA). Data were analysed with appropriate statistical indices: mean, mode, standard deviation, relative risk, Chi-square test, *P* value and linear regression analyses. Univariate and multivariate logistic regression analyses were performed to identify factors related to profound visual loss, which was defined as visual acuity worse than 0.8 LogMAR. *P* values of 0.05 or less within 95% CI was considered to be statistically significant.

RESULTS

Sociodemographic and clinical profile of ocular trauma have been described in Table 1. Ocular trauma was more common in the age group of 21-30 and 31-40 years (48 and 38 respectively) which is young productive population. Higher prevalence of ocular trauma was seen in males with M:F ratio of 4.8:1. People from rural areas had 3 times higher risk of ocular injuries than urban with rural:urban ratio being 3:1. With reference to socioeconomic status, higher prevalence was seen in lower socioeconomic group (56%). Out of 200 patients, 74 were labourer, 40 were student, 26 each were farmers and industrial workers, 16 were housewives, 14 were sedentary workers and 4 were shopkeeper. So, it was observed that maximum number of patients (37%) were labourer. Both right and left eye were affected equally (49% each), however bilateral injuries were seen only in 2% cases and caused by roadside accident.

Table 1: Sociodemographic And Clinical Profile

Age group	Male	Female	Total
0-10 year	19	5	24
11-20 year	24	6	30
21-30 year	38	10	48
31-40 year	29	9	38
41-50 year	16	8	24
51-60 year	18	2	20
>60 year	12	4	16

	Number Of Cases
Area wise distribution	
Rural	148(74%)
Urban	52(26%)
Socioeconomic Status	
Lower	112(56%)
Middle	52(26%)
Upper	36(18%)
Eye Involved	
Right	98(49%)
Left	98(49%)
Bilateral	4(2%)

Out of 200 patients, 60 were involved in road side accidents, 44 patients had home related injuries, 44 had assault related injuries, 30 were involved in work-related injuries and 26 were sports related injuries. Most common etiology of ocular trauma was RSA in 60 cases followed by wood in 22 patients (11%).

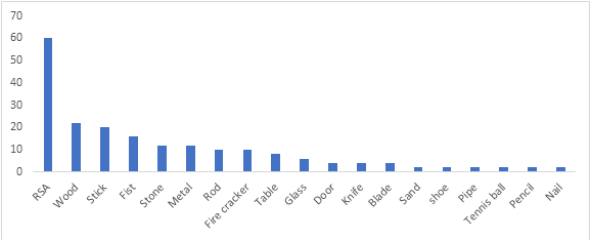

Figure 1: Cause of Injury

Out of 200 patients, 54 presented within 24 hours, 88 patients consulted between 1-5 days, 34 between 6 days-1 month, 18 between 1-12 month and 6 patients presented after 12 months. It was observed that majority of patients (44%) presented between 1-5 days of injury while a few of them (3%) presented after 12 month of injury.

Out of 200 patients, 162 (81%) had closed globe injuries, whereas 38 (19%) had open globe injuries. In closed globe injury group, contusion, lamellar laceration, superficial foreign body and mixed injuries were found in 74 (37%), 26 (13%), 48 (24%) and 14 (7%) eyes respectively While among open globe injuries, penetrating injuries, globe rupture, perforating injuries and IOFB were seen in 18 (9%), 10(5%), 8 (4%) and 2 (1%) respectively. It was found that the penetrating (9%) and contusion injuries (37%) were the most common cause of open and closed globe injuries respectively.

In this study, conjunctiva (79%) was the most common structure involved in ocular trauma followed by trauma to eyelid (66%) and cornea (43%). Edema (33%) was the most common finding in periorbital lesions, whereas edema (62%) followed by ecchymosis (53%) were common in eyelid injuries. Conjunctival chemosis (61%) followed by subconjunctival haemorrhage (51%) were the most frequently encountered conjunctival injuries. Among the corneal injuries, laceration (13%) was the most common finding whereas it was collapse (11%) for anterior chamber lesions. Iris prolapse (8%) and irregular pupil (15%) were the most frequently observed sign among injuries to iris and pupil respectively. Scleral laceration (6%) was found to be the most common form of scleral injury whereas it was traumatic cataract for lenticular lesions. Among posterior segment injuries, vitreous haemorrhage (8%) was most common followed by retinal detachment (5%) and endophthalmitis (3%). Out of 200 patients, 168 had only anterior segment involvement while 32 had both anterior and posterior segment involvement. Patients with only anterior segment involvement have better presenting VA than patients with both anterior and posterior segment involvement. 73% cases with anterior segment injuries had presenting BCVA of <0.8 LogMAR only 8% cases with both anterior and posterior segment injuries had presenting BCVA of <0.8 LogMAR.

For purpose of statistical correlation and in accordance to statistical software the final visual acuity was taken in LogMAR units and categorized into two groups <0.8 LogMAR and >0.8 LogMAR. Table 2 shows various factors affecting the final visual outcome type of injury; presenting visual acuity (PVA); time period between injury and treatment; size of tear; anterior segment involvement, posterior segment involvement and OTS.

Table 2: Factors Affecting The Final Visual Outcome

Factors	Nuber of Case, n(%)	BCVA <0.8 LogMAR	BCVA >0.8 LogMAR	P Value
1. Type of injury				

Open globe				
Penetrating	18(9%)	8	10	<0.05
Rupture	10(5%)	2	8	<0.05
Perforating	8(4%)	2	6	<0.05
Retained IOFB	2(1%)	1	1	<0.05
Closed Globe				
Contusion	74(37%)	68	6	<0.05
Laceration	26(13%)	24	2	<0.05
Superficial FB	48(24%)	38	10	<0.05
Mixed injuries	14(7%)	8	6	<0.05
2. Zone of injury				
I	112(56%)	90	22	<0.05
II	56(28%)	30	26	<0.05
III	32(16%)	2	30	<0.05
3. Presenting BCVA				
<0.8 LogMAR	86(43%)	80	6	<0.05
>0.8 LogMAR	114(57%)	34	80	<0.05
4. Time of presentation				
< 24 hr	54(27%)	34	20	<0.05
> 24 hr	146(73%)	56	90	<0.05
5. Size of tear				
< 5mm	28(14%)	20	8	<0.05
> 5mm	10(5%)	3	7	<0.05
6. Ant segment involvement				
Hyphema	32(16%)	22	10	<0.05
Uveal tissue prolapse	36(18%)	16	20	<0.05
Lens damage	22(11%)	16	6	<0.05
7. Posterior segment involvement				
VH	16(8%)	6	10	<0.05
RD	10(5%)	2	8	<0.05
Endophthalmitis	6(3%)	0	6	<0.05
8. Ocular trauma score (OTS) n=38				
1	4	0	4	<0.05
2	6	0	6	<0.05
3	12	2	10	<0.05
4	8	5	3	<0.05
5	8	6	2	<0.05

With reference to type of wound, 34.21% and 86.39% patients with penetrating injuries and contusion wounds respectively could achieve final visual acuity <0.8 LogMAR. In 57% patients presenting with visual acuity better than 0.8 LogMAR, 70.17% achieved final visual acuity better than 0.8 LogMAR as opposed to 43% who presented with visual acuity worse than 0.8 LogMAR, in which only 7.08% cases achieved final visual acuity better than 0.8 LogMAR. Various factors affecting final visual outcome are summarized in table 2. Patients presenting within 24 hours, had achieved a final BCVA of <0.8 LogMAR than those presenting beyond 24 hours. Patient with corneal tear >5mm size, vitreous haemorrhage, retinal detachment, endophthalmitis, zone III involvement and poor OTS score had poor prognosis.

DISCUSSION

Ocular trauma is a major public health problem and an important cause of monocular visual impairment and blindness. Present prospective, hospital based interventional study was conducted to determine clinical profile of ocular trauma and factors affecting visual outcome.

In our study, predominant age group involved was found to be 21-40 years (43% cases) because of more outdoor activities and more active lifestyle. This was consistent with the study by Dhasmana et al on 103 eyes of 88 patients which showed that mean age of presentation was 31.2±13.6 years.[11]

Out of 200 patients, there were 166 males and 34 females. In our study, right and left eye were involved in 98 cases each (49% each) whereas both eyes were involved in 4 cases (2%). In a study by Maurya et al, left eye was affected in 46.34%, right eye in 42.68% while in 10.98% cases, both eye were injured.[12]

In our study it was observed that ocular trauma was more common in students (37%). This was followed by labourers (20%), farmers (20%) and industry workers (13%). In a study by Shaeri et al, students (35.4%) were the most frequently involved population followed by laborers (22%) and industrial workers (20.7%).[13] The possible reason behind the high incidence of ocular trauma among these populations could be their work place exposure, lack of awareness and lack of use of safety gears by this population as well as more active lifestyle of the youth in terms of sports activities, driving and occupational exposures.

According to place of injury, RSA (30%) formed the major bulk in our study, followed by home related trauma (22%), assault (20%), work place injury (15%) and sports related injury (13%). In a study by Nagrale et al, the place of injury were RSA, occupation related and sports related activities in 54 (45%), 39 (32.5%) and 24 (20%) respectively.[14]

In our study, we found that the most common cause of injury was road side accident (30%) followed by injury due to wood (11%), stick (10%) and fist (8%). While this is consistent with some studies, others do have a variety of findings. A study by Enock et al comprising of 182 patients, showed that motorcycle related road traffic accident was the most common cause of ocular injury in 56 patients.[15]

Out of 200 patients examined in our study, 27% presented within 24 hours whereas 44% presented between 1-5 days, 17% patients between 6 days-1month and 12% later than 1 month. The main cause of late presentation to hospital was found to be lack of awareness among general population.

In our study, out of 200 patients with ocular trauma, 162 had closed globe injuries whereas 38 had open globe injuries. This was consistent with the study conducted by Misra et al who found that closed globe injury (68.33%) was more common than open globe injury (31.67%).[6] It was found that the penetrating (9%) and contusion injuries (37%) were the most common cause of open and closed globe injuries respectively.

Out of 200 patients, 168 had only anterior segment involvement while 32 had both anterior and posterior segment involvement. Patients with only anterior segment involvement have better presenting VA than patients with both anterior and posterior segment involvement. 73% cases with anterior segment injuries had presenting BCVA of <0.8 LogMAR, while only 8% cases with both anterior and posterior segment injuries had presenting BCVA of <0.8 LogMAR. With reference to type of wound, 34.21% and 86.39% patients with penetrating injuries and contusion wounds respectively could achieve final visual acuity <0.8 LogMAR. In 57% patients presenting with visual acuity better than 0.8 LogMAR, 70.17% achieved final visual acuity better than 0.8 LogMAR as opposed to 43% who presented with visual acuity worse than 0.8 LogMAR, in which only 7.08% cases achieved final visual acuity better than 0.8 LogMAR. Various factors affecting final visual outcome are summarized in table 2. Patients presenting within 24 hours, had achieved a final BCVA of <0.8 LogMAR than those presenting beyond 24 hours. Patient with corneal tear >5mm size, vitreous haemorrhage, retinal detachment, endophthalmitis, zone III involvement and poor OTS score had poor prognosis ($p<0.05$).

CONCLUSION

It is clear from our study that ocular trauma is more common in young males which are productive population of economy. The road side accident was found to be the commonest cause

of ocular trauma. The visual outcome depends upon the initial visual acuity, type of injury, extent of ocular damage and the period between the time of injury and presentation to the hospital. The profound visual loss was associated with delayed intervention especially in cases with poor vision at presentation and involvement of the posterior segment. Many of the injuries could have been prevented, if the patients had used protective eye gear during work or play. This awareness can be brought about by health education in schools and factories. Early referral, prompt evaluation and treatment can reduce the sight threatening complications as well as salvage the eye, both anatomically and functionally.

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