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Original Research Article

Clinical profile of ocular trauma in a tertiary care hospital of Southern Rajasthan

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ABSTRACT

Background: Ocular trauma is a major cause of preventable visual impairment and blindness leading to permanent loss of vision and deterioration of quality of life. 90% of the injuries are preventable. Aim of the current study was to study the clinical profile of patients with ocular trauma at a tertiary care hospital in Southern Rajasthan. Current study was a cross- sectional, observational study was conducted at Geetanjali medical college and hospital, Udaipur.
Methods: After taking a well-informed consent a generalized detailed history of 108 cases (123 injured eyes) was obtained. Assessment of best corrected visual acuity, near vision, intraocular pressure, slit-lamp evaluation and dilated fundus examination was carried out. Then injury was classified as per BETTS classification. Patients with corneal foreign bodies and chemical injuries were recorded separately. Imaging modalities like ultrasound B-scan, CT-scan and MRI were employed wherever required.
Results: Number of males (98) was much higher than females (9) in our study. Male: female ratio was found to be 10.8:1. The most commonly affected age group was 21-30 years, this highlights the alarmingly high incidence of ocular injuries in economically active young males. Farming is the primary occupation across India, hence it deserves a special mention. 22% of injury cases in our study were farm- work related injuries. Farmers need to be educated and provided eye protective equipment during high-risk activities. Laws regarding agricultural code of practice should be implemented and followed.
Conclusions: In our study, not a single case out of 108 had used eye protection at the time of injury. Every effort should be made to create awareness regarding use of safety measures during driving and engaging in high-risk occupations. This will help prevent sight-threatening complications of ocular trauma and the deleterious impact on quality of life.

Keywords: Ocular trauma, Betts classification, Open globe injury, Closed globe injury, Chemical injury

INTRODUCTION

The eye contributes only 0.27% of the total body surface area and 4% of the facial area, yet it is the third most common organ affected by trauma after hands and feet.[1] Ocular trauma is a major cause of preventable visual impairment & blindness. It is accountable for 7-45% of non-congenital monocular blindness in adults.[2,3] 90% of these injuries are preventable by simple measures. Ocular trauma may lead to permanent loss of vision and deterioration of quality of life.[4-7]

The global annual incidence of ocular trauma, as estimated by the World health organization (WHO) is around 55 million.[8-19] Annually, the incidence of blindness due to trauma is 1.6 million, while 2.3 million cases suffer bilateral visual disability and 19 million cases suffer unilateral visual impairment.[5] High risk of ocular trauma was found in children and adults under age

of 30 years in various studies and 12-38% children reported history of ocular trauma.[7,8] As evidenced in various previous studies, the most frequently observed morbidities following ocular trauma are corneal tear, scleral tear and lens damage followed by lid and canalicular laceration, uveal prolapse, anterior chamber (AC) abnormality, retinal detachment and optic nerve avulsion.[11-16] Majority of the patients reported to a medical facility after 24 hours from the time of trauma.[1,8,12,16-19] Patients who reported within 24 hours of eye injury showed better visual outcome as compared to those presenting later than 24 hours.[12] Causes of ocular trauma vary in different geographical locations. The most important ones noted in developing countries in previous studies were road traffic accidents (RTA), work place related injuries and mishaps during sports and recreational activities.[4,5,19]

Kuhn et al gave the Birmingham eye trauma terminology system (BETTS) in his study. He defined various terms related to ocular trauma as follows: eye wall: sclera and cornea, closed globe injury: the eye wall does not have a full-thickness wound, contusion: no full thickness wound of the eye wall (impact injury by blunt trauma), lamellar laceration partial thickness wound of the eye wall, open globe injury: the eye wall has a full-thickness wound, rupture: full-thickness wound of the eye wall, caused by a blunt object. The impact results in momentary increase of the IOP and an inside-out injury mechanism, laceration-Full-thickness wound of the eye wall, usually caused by a sharp object. The wound occurs at the impact site by an outside-in mechanism, penetrating injury: single laceration of the eye wall, usually caused by a sharp object, intraocular foreign body injury: retained foreign object(s) causing entrance laceration(s), perforating injury: two full-thickness lacerations (entrance and exit) of the eye wall, usually caused by a sharp object or missile.

Knowledge about the pattern of ocular trauma and its causes is required to identify the public health burden. This data can also help in planning prevention of ocular injuries in high risk age groups and hazardous work places. This study takes into consideration the source, place and type of injuries and their classification. It gives us detailed information about the nature and severity of ocular morbidity due to trauma. Despite its public health importance, very few studies have been carried out in different parts of India.

Objectives

Objectives of current study were: to define the extent of ocular trauma as per BETTS in ocular trauma cases, to find the sources of ocular trauma in this geographical area, to study the socio-demographic distribution of ocular trauma cases and to study the association of ocular complications with the delay in presentation after ocular trauma.

METHODS

A cross-sectional, observational study was conducted in ocular trauma cases between February 2019 and September 2020 Geetanjali medical college and hospital (GMCH), Udaipur, a state of the art tertiary care hospital of Southern Rajasthan.

Sample size

A total of 108 cases (123 injured eyes) were included in the study.

Inclusion criteria

All the consenting adult patients coming to emergency department or eye OPD of GMCH with history of any ocular trauma were included in the study.

Exclusion criteria

Patients refusing informed consent or below 18 years of age were excluded from the study.

Statistical analysis

Data were described in terms of range; mean ± standard deviation (±SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations were done using SPSS (statistical package for the social science) 21 version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

Procedure

After taking a well informed consent, detailed history regarding patient's age, sex, source, place and time since injury was obtained. Assessment of best corrected visual acuity by Snellen's distant and near vision chart was done (unconscious and uncooperative patients were not assessed). Measurement of intraocular pressure was done by non-contact tonometry whenever feasible. Slit-lamp examination was done for detailed ocular assessment in ambulatory patients. (unconscious, uncooperative and severely injured patients were assessed by torch light at bedside). Fundus was examined using +20 D lens with an indirect ophthalmoscope after dilation of pupils with eyedrops containing tropicamide 0.8% and phenylephrine 5.0%. After thorough assessment, the injury was classified as per BETTS classification:[20]

Patients with corneal foreign body injury and chemical injuries were recorded separately apart from BETTS classification. Fundus photography was done in patients with abnormal fundus findings related to ocular trauma. Imaging modalities like ultrasound B-scan, CT-scan and MRI were employed wherever required.

RESULTS

A total of 108 cases (123 eyes) presenting with a history of ocular trauma were studied between February 2019 and September 2020. The most commonly affected age group was 21-30 years (47%) and 98 patients (91%) out of 108 in our study were males. Age and gender wise distribution can be seen as in (Table 1-2). 83 out of 123 eyes (68%) presented with closed globe injuries. 21 eyes (17%) had chemical injuries.

Table 1: Age wise distribution of cases.

Age group (years)	N	%
<21	14	13
21-30	51	47
31-40	21	19
41-50	12	11
51-60	5	5
>60	5	5
Total	108	100

Table 1: Sex wise distribution of cases.

Sex	N	%
Male	98	91
Female	10	09
Total	108	100

Penetrating injuries (6%) were most common among open globe injuries. Road was the most common place of injury contributing 32 (30%) injury cases. Farm was the second most common place of injury with 24 (22%) cases. Road traffic accidents (RTA) was the most common source of injury (21.30%) followed by foreign body (8.33%) on road. At farm, the most common source was found to be vegetative matter (15.74%).Various sources of injuries in different places have been demonstrated in (Table 3). Foreign body (28%) was the overall most common source of injury at the various places of injury. RTA (21%) was second most common source of injury. Chemical injuries compromised 11% of injuries. 47 patients (44%) presented to the hospital within 6 hours of injury while 21patients (19%) took more than 1 month before consulting a healthcare facility after injury as consisted in (Table 4). The most common injury according to the BETTS classification was found to be closed globe contusion injury (58%) followed by chemical injuries (17%) as seen in (Table 5). As seen in (Table 6), statistical analysis concluded that open globe injuries were more severe in terms of BCVA as compared to closed-globe injuries (p= 0.001). Also it has been noted that the anterior segment parts were more involved in injuries as compared to the posterior parts of the eye. As is seen in table 7 the eyelids (53%), cornea (59%) and conjunctiva (65%) were the most involved anatomical sites in any ocular injury.

Table 3: Various sources of injuries in different places.

Place of injury	Source of injury	N	%
Road	RTA	23	21.30
	FB	9	8.33
Farm	Vegetative matter	17	15.74
	Animal induced	5	4.63
	Wooden stick	1	0.93
	Electric shock	1	0.93
Home	Firecrackers	8	7.41
	Tool	4	3.70
	Hot oil	1	0.93
	Pressure cooker	1	0.93
	Sanitizer	1	0.93
	Chemical	3	2.78
Industry	Chemical	8	7.41
	FB	4	3.70
	Firecrackers	1	0.93
Playground	Ball	3	2.78
	Wooden stick	3	2.78
	FB	1	0.93
	Shuttlecock	1	0.93
Outdoor	Stone	2	1.85
	Chemical	1	0.93
	Insect	1	0.93
	Sanitizer	1	0.93
	Animal induced	1	0.93
	Wooden stick	1	0.93
School	Ball	1	0.93
	Fist	1	0.93
	Pencil	1	0.93
Hospital	Ampoule	2	1.85
	Sanitizer	1	0.93
Total		108	100.00

FB=foreign body, RTA=road traffic accident

DISCUSSION

This is a prospective cross-sectional study comprising 123 eyes of 108 patients presenting with a history of ocular trauma to a tertiary care hospital in Southern Rajasthan. All the patients above 18 years were included in the study by consecutive sampling. Identifying the

source, place and severity of injury and high-risk groups in this particular geographical region can improve the scope for betterment of preventive strategies and in preventing permanent loss of vision. In our study, 47 patients (44%) presented to the hospital within 6 hours of injury while 21 patients (19%) took more than 1 month before consulting a tertiary healthcare facility after injury. In contrast to our study, Alem et al in their study reported that 74.51% patients presented after 3 or more days of injury.[9]

Table 4: Cases classified as per time taken to reach hospital after injury.

Time since injury	N	%
<6 hours	47	44.00
6-12 hours	14	13.00
12-24 hours	5	5.00
1-3 days	13	12.00
3-7 days	5	5.00
1 week to 1 month	3	2.00
>1 month	21	19.00
Total	108	100.00

Table 5: Classification of injury as per BETTS.

Classification of injury as per BETTS		N	%
Closed-globe injury	Lamellar laceration	5	4
	Contusion	71	58
	Corneal FB	7	6
Open-globe injury	Penetrating injury	7	6
	Intraocular FB	2	2
	Rupture	5	4
	Laceration	5	4
Chemical injury	Chemical injuries	21	17
Total		123	100

This difference may be due to the fact that the aforementioned study was conducted in a distant referral hospital, whereas the present study was based in an easily accessible tertiary care hospital in the vicinity of a crowded city and on a busy national highway. This can also be attributed to better awareness towards ocular trauma in our region.

In our study, RTA was the most common source of injury (21.30%) on road. 24% injuries were work related. Dhasmana et al in their study reported that 37.86% of eyes were injured in RTA while 33% eye injuries were work-place related.[8] The influx of increased number of RTA cases can be attributed to our hospital being located on a heavily congested national highway. People in this geographical region are more involved in farm-related pursuits and industrial activities. Hence, work-related injuries are found to be proportionately higher in incidence in the present study. In our study, the most commonly affected age-group was 21-30 years (47%) and most commonly affected sex was males (91%). It is in accordance with the study conducted by Titiyal et al, who reported that 66% of patients were within the age group of 21-30 years.[19]

Figure 1: Traumatic eye ball luxation.

Figure 2: Endophthalmitis following penetrating injury.

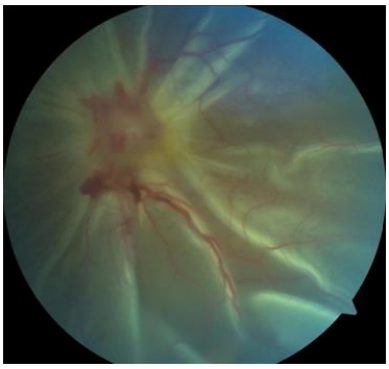

Figure 3: Fundus photograph of traumatic optic nerve avulsion.

They also reported that the most commonly affected gender were males (69%).[19] This higher incidence in young males can be attributed to higher risk-taking attitude, more exposure to outdoor environment and roads and more number of young males being employed in high-risk occupations. In our study, cornea was the most commonly affected site in 80 out of 123 eyes (65%) and Conjunctiva was affected in 72 (59%) injured eyes.

Table 6: Correlation between BCVA at presentation and the type of injury at presentation.

Parameters	BCVA at Presentation						
Classification of injury as per BETTS	**>6/12**	**6/18-6/36**	**6/60-PL +ve**	**PL -ve**	**Not assessable**	**Total**	**P value**
Closed-globe injury	43	10	17	3	10	83	0.001
Open-globe injury	2	1	7	8	1	19	
Chemical injury	15	5	1	0	0	21	
Total	60	16	25	11	11	123	

Table 7: Pattern of ocular trauma as per anatomical site.

Pattern of ocular trauma in relation to anatomical site	Number of eyes with abnormality due to trauma	%
Eyelids	65	53
Conjunctiva	72	59
Cornea	80	65
Sclera	12	10
Anterior chamber	22	18
Uvea	12	10
Pupil	15	12
Lens	8	7
Vitreous	6	5
Retina	16	13

Table 8: Classification of injury as per BETTS.

BCVA in injured eye	Classification of injury as per BETTS							
	Closed-globeinjury		Open-globe injury		Chemical injury		Total	
	Present study	Dhasmana et al	Present study	Dhasmana et al	Present study	Dhasmana et al	Present study	Dhasmana et al
>6/12 (%)	35	20	2	5	12	0	49	25
6/18-6/36 (%)	8	9	1	5	4	3	13	17
6/60-2/60 (%)	2	5	0	16	0	2	2	23
1/60- PL +ve (%)	12	13	6	14	1	2	19	29
PL -ve (%)	2	2	7	2	0	1	9	5
Not assessable (%)	8	nil	1	nil	0	nil	9	nil
Total (%)	67	50	16	42	17	8	100	100

Timsinha et al in their study reported that cornea was affected most commonly in 47.81% trauma cases while 31.87% cases had abnormal findings in conjunctiva.[21] Open globe injuries were related to worse BCVA at presentation in comparison with closed globe injuries (p=0.001). In our study, 83 out of 123 eyes (68%) presented with closed globe injuries. 21 eyes (17%) had chemical injuries. 19 eyes presented with open-globe injuries (15%). Dhasmana et al reported the incidence of closed-globe injuries, open-globe injuries and chemical injuries to be 50%, 42% and 8% respectively.[8] They also associated the type of injury with BCVA at presentation. Comparision data from present study and their study is given in (Table 8).

CONCLUSION

In our study, not a single case out of 108 had used eye protection at the time of injury. Every effort should be made to create awareness regarding use of safety measures during driving and engaging in high-risk occupations. This will help prevent sight-threatening complications of ocular trauma and the deleterious impact on quality of life.

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