

Epidemiology of Ocular Trauma in a Tertiary Eye Care Center of Central India

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Abstract: Aims: To study the epidemiology of ocular trauma in patients presenting in a tertiary care centre and to evaluate its clinical presentation. Study Design: This prospective, hospital-based, observational study conducted at the Ophthalmology and Emergency Outpatient Departments from January 2021 to December 2021. Methods and Material: Detailed history was taken with special consideration to time and mode of injury. Patients examined as per the standard clinical procedures to identify the type, extent, severity of injury and impact on ocular structures. Statistical analysis used: Information was collected in a predesigned and pretested proforma. The collected data were entered and analysed using SPSS (version 17.0). Categorical and numerical variables analysed as frequency and percentage. Results: During this study, 270 patients were taken into consideration with 212 males (78.50%) and 58 females (21.50%) patients. Age group with maximum incidence was 31-40 years (24.44%) and 90.71% unilateral involvement. Road traffic accidents (34.07%) had highest incidence among all injuries and assaults (26.66%) among non RTA causes. Maximum patients (36.26%) presented within 6 to 24 hours. Based on BETTS classification close globe (69.26%) were more common than open globe injuries (30.74%) with Contusion (61.85%) being more common in closed globe and penetrating injuries (7.77%) in open globe injuries. Conclusions: This study highlights epidemiology of ocular trauma in patients presenting in a tertiary care centre in Central India. Mass awareness regarding potential risk factors & agents causing injury can prevent number of ocular hazards.

Keywords: Ocular trauma, BETTS, Open globe injury, closed globe injury

1. Introduction

Ocular trauma is a major cause of visual impairment & preventable blindness. Impact of trauma on human eye may range from lacerated globe to minute subconjunctival haemorrhage. Owing to the delicacy of ocular tissues, delayed presentation worsens the visual outcome. Awareness about risk of ocular trauma, timely presentation, and need to adopt preventive strategies should be focused, especially during travel, playground, and at workplace.

This study aims at providing epidemiological data on ocular injuries in patients presenting in a tertiary care center in central India. It will help in the planning and provision of eye care and implementing preventive and safety strategies in this region. This study takes into consideration the causative agents, type of injuries & their classification. Despite having major socioeconomic impact, very less data is available on the magnitude & risk factors of ocular trauma. Few such studies have been carried out in different parts of India but no such study has been carried out in this region.

2. Subjects and Methods

Patients attending OPD and emergency at our institute with primary diagnosis of trauma during the period January 2021 to December 2021 were included in the study. A total of 270 patients were examined & data was collected. The demographic data of each patient including age, sex and geographical distribution were recorded. A detailed history

was obtained regarding the trauma, its nature & circumstances, unilateral or bilateral involvement and time of presentation. Detailed ophthalmological examination of all patients was carried out.

Snellen's chart was used to record visual acuity. Slit lamp examination was done to rule out any eyelid injury, conjunctiva, corneal, scleral, Iris and anterior chamber involvement. Intraocular pressure was measured. Gonioscopy was done in closed globe injuries. 90D examination & indirect ophthalmoscopy were carried out to examine posterior segment for detection of vitreous haemorrhage, retinal detachment, retinal break or tear, choroidal rupture, choroidal haemorrhage or subretinal haemorrhage.

Radiological investigations like B-Scan, X-Ray orbit, CT Scan, MRI were done as indicated.

All the terminologies were based on BETTS i.e. Birmingham Eye Trauma Terminology system. It establishes easy to use, unambiguous terminology organized in a clinically relevant design.

Closed globe injuries where there was no full thickness wound of the eyeball were further classified as contusions and lamellar lacerations (partial thickness wound). Open globe injuries with full thickness wound of the eyeball were divided into ruptures (inside out mechanism) and lacerations (outside in mechanism). Lacerations further into penetrating

(entry wound), perforating (entry and exit wound) and those with retained intraocular foreign body.

3. Results

A total of 270 patients were examined during the period of one year. The number of persons sustaining injuries was highest i.e. 66 (24.44%) in the age group of 31 to 40 years followed by 57 cases (21.11%) in the age group of 21 to 30 years. In paediatric age group (1-10 yrs) there were 36 cases (13.4%) and 11-20 years constituted 38 cases (14.07%). Elderly patients from 61-70 years constituted 13 cases (4.81%) and 7 cases were above 70 years (2.59%).[table 1]

Out of the total 270 cases, 212 were male (78.5%) and 58 female (21.5%). Male to female ratio is found to be 3.65:1. Female were most commonly affected in age group of 41-50 years and male most commonly in age group of 31-40 years.[table 1]

Our study shows unilateral ocular injuries (90.11%) more common than bilateral (9.89%) with no significant difference between right and left eye[Table 2] .Based on the geographical profile 109 cases (40.37%) belonged to urban population and 161 (59.62%) belonged to rural population.92 patients (34.07%) had injury due to Road traffic accident (RTA) and 72 cases (26.66%) had history of assault. Domestic trauma (14.81%), work related trauma (12.22%) and Sport related trauma (12.22%) were less common mode of ocular trauma.[Table 2]

In this study, after ocular trauma, 98 patients (36.26%) presented within 6-24 hours followed by 67 patients (24.81%) within less than 6 hours.64 patients presented within 24-72 Hours (23.70%), 25 within 3-7 days (9.25%). 16 patients presented after 7 days (5.92%).[Table -3]

Close globe injuries (69.26%) were more common than open globe injury (30.74%). In closed globe injury Contusion (61.85%) were more common than lamellar laceration (7.4%). In open globe,penetrating globe injuries (14.81%) were more common followed by Perforating globe injuries (4.81%) andintraocular foreign body injuries (2.22%). Among open globe injuries 8.88% cases had globe rupture.[Table 4]

Out of 270 patients , ocular adnexal injuries were found to be most common and seen in 204 cases (75.5%) followed by conjunctival injuries in 127 cases (47%), corneal injuries in 115 cases (42.6%), Iris- pupil injuries in 118 cases (43.7%), Anterior chamber injuries in 99 cases (36.6%), posterior segment injuries in 94 cases (34.81%) , Lens related injuries in 35 cases (13%), corneal-scleral injuries in 31 cases (11.5%) and scleral injuries in minimum 27 cases (10%).

Ocular adenexal injuries were found in 75.5% cases among which periorbital edema/ecchymosis was seen in 50.37% of ocular trauma patients followed by lid laceration (41.48%) and lid abrasion (26.66%). Orbial fracture (8.88%), Traumatic ptosis (8.88%), Extra ocular muscle rupture (6.66%),Traumatic optic neuropathy (9.62%),papilledema (4.44%), blow out fracture (2.22%) were other major adenexal injuries seen. Carotico cavernous fistula was found

in 2 patients (0.74%) and intra ocular foreign body was found in 5 patients (1.85%).

Counjunctival injuries were found in 127 cases (47%) with subconjunctival hemorrhage forming the major component of 96 cases (35.55%) followed by chemosis seen in 72 cases (26.66%). Conjunctival laceration and conjunctival foreign body were seen in 4.44% and 3.33% cases respectively.

Corneal injuries seen in 115 cases (42.59%) were mainly composed of corneal edema in 9.62% and corneal foreign body in 7.77%. Corneal abrasion and corneal ulcer were seen in 4.44% and 6.66% respectively. Corneal laceration with iris prolapse was seen in 5.92% and without iris prolapse in 4.44%. Scleral injuries were found in 27 cases (10%) and corneo-scleral injuries in 31cases (11.48%).

Anterior chamber injuries are found in 99 patients (36.6%) among which 46 had traumatic hyphema (17.03%) and 13 had hypopyon (4.81%). Traumatic hypotony was found in 32 patients (11.85%), angle recession in 21 patients (7.77%) and traumatic glaucoma in 5 cases (1.85%).

Among the lens related inuries (13%), traumatic cataract was found in 22 cases (8.14%), subluxated/dislocated lens in 7 cases (2.59%) and vossius ring was seen in 2 patients (0.74%).

Among the posterior segment injuries, vitreous hemorrhage was seen in 12.96% cases, berlins edema in 12 patients (4.44%), retinal detachment in 26 patients (9.62%). Endophthalmitis was seen in 2.96% cases.

Table 1: Age and gender wise distribution of ocular trauma patients

Age Group	Male	Female	Total	Percentage
1-10	14	12	36	13.4%
11-20	30	08	38	14.07%
21-30	48	09	57	21.11%
31-40	58	08	66	24.44%
41-50	29	11	38	14.07%
51-60	18	05	23	8.51%
61-70	11	02	13	4.81%
>70	04	03	07	2.59%
Total	212 (78.5%)	58 (21.5%)	270	100%

Table 2: Correlation with mode of Trauma

Mode of trauma	No. of patients	U/L	B/L	Percentage
Domestic	40	35	05	14.81 %
Sport related	33	31	02	12.22 %
Assault	72	67	05	26.66 %
RTA	92	80	12	34.07 %
Work related	33	31	02	12.22 %
Total	270	244	26	100%

Table 3: Time of presentation after ocular trauma

Duration	No. of patients	Percentage
< 6 Hours	67	24.81%
6 – 24 Hours	98	36.26%
24 – 72 Hours	64	23.70%
3 – 7 Days	25	09.25%
More than 7 Days	16	5.92%
Total	270	100%

Table 4: Injury classification according to Birmingham Eye Trauma Terminology System

Ocular injuries	No. of patients	Percentage
Open globe	83	30.74%
<u>Laceration</u>	59	21.85%
Penetrating	40	14.81%
IOFB	6	2.22%
Perforating	13	4.81%
<u>Rupture</u>	24	8.88%
Closed globe	187	69.26%
Contusion	167	61.85%
Lamellar laceration	20	7.40%

Table 5: Distribution of injuries

<u>OCULAR ADENEXAL INJURY</u>		
Orbital fracture	24	8.88%
Blowout fracture	6	2.22%
Orbital emphysema	3	1.10%
Carotid cavernous fistula	2	0.74%
Intra orbital foreign body	5	1.85%
Extraocular muscle involvement	18	6.66%
Periorbital edema/Ecchymosis	148	54.81%
Lid laceration	112	41.48%
Lid abrasion	72	26.66%
Traumatic ptosis	24	8.88%
Punctal/canalicular injuries	12	4.44%
Traumatic optic neuropathy	26	9.62%
Nerve related injuries	18	6.66%
<u>CONJUNCTIVAL INJURIES-</u>	127	47.00%
Subconjunctival haemorrhage	96	35.55%
Chemosis	72	26.66%
Conjunctival laceration	12	4.44%
Conjunctival foreign body	9	3.33%
<u>ANTERIOR CHAMBER INJURIES-</u>	99	36.60%
Foreign body	4	1.48%
Traumatic hyphema	46	17.03%
Hypopyon	13	4.81%
Angle recession	21	7.77%
Traumatic glaucoma	5	1.85%
Traumatic hypotony	32	11.85%
<u>LENS RELATED-</u>	35	13.00%
Subluxated/ Dislocated	7	2.59%
Vossius ring	2	0.74%
Traumatic cataract	22	8.14%
Traumatic absorption of lens	4	1.48%
<u>CORNEAL INJURIES-</u>	115	42.59%
Corneal abrasion	12	4.44%
Corneal edema	26	9.62%
Corneal foreign body	21	7.77%
Corneal ulcer	18	6.66%
Blood staining of cornea	7	2.59%
Corneal lamellar laceration	8	2.96%
Corneal laceration without iris prolapse	12	4.44%
Corneal laceration with iris prolapse	16	5.92%
Corneal perforation	4	1.48%
<u>SCLERAL INJURIES-</u>	27	10%
Scleral penetrating injury	18	6.66%
Without uveal tissue prolapse	6	2.22%
With uveal tissue prolapse	12	4.44%
Scleral perforation	9	3.33%
<u>CORNEOSCLERAL INJURIES-</u>	31	11.48%
Corneal scleral penetrating injury	27	10%
Without uveal tissue prolapse	12	4.44%
With uveal tissue prolapse	15	5.55%
Corneal scleral perforation	4	1.48%
<u>VITREOUS-</u>	38	14.07%
Vitreous haemorrhage	35	12.96%

Vitreous prolapse	3	1.11%
<u>RETINA-</u>	47	17.39%
Retinal haemorrhage	1	0.37%
Berlins oedema	12	4.44%
Retinal detachment	26	9.62%
Retinal tear	5	1.85%
Macular edema	2	0.74%
Macular hole	1	0.37%
<u>CHOROID-</u>	10	3.70%
Choroidal rupture	6	2.22%
Choroidal detachment	4	1.48%
<u>IOFB IN POSTERIOR SEGMENT-</u>	2	0.74%
<u>ENDOPHTHALMITIS-</u>	8	2.96%



A-full thickness lid tear, B- corneal tear with incarcerated iris, C-Penetrating injury with endophthalmitis, D- conjunctival laceration, E-Corneal lamellar laceration F- IOFB

4. Discussion

Ocular injuries can occur in almost any setting. These mainly include road accidents, assault, rural agricultural farms, occupational work places, homes, recreational and sports centers. From the available literature it is seen that very less data on ocular trauma is available from Indian studies. Very few data is available from Central India where this study was undertaken.

The data from this study is helpful in defining target population and accordingly, preventive measures can be taken. Epidemiological profile of ocular trauma varies in developing and developed countries. Economical background, public awareness and availability of resources are responsible for this difference.

In this study, 270 patients were included. Our study showed 24.44% of ocular trauma occurred in young adults (31-40 years) while in pediatric age group (1-10 years) and elder individuals(>60yrs) constitutes 13.4 % and 7.40% respectively .So, potential earning group was more commonly affected leading to loss of work days & economic burden on their family. It is probably due to more involvement of young adults in outdoor activities and violence, makes them more susceptible tot trauma, whereas restricted mobility of the elderly makes them less susceptible to trauma similar as previous studies by Shivanand B. Patil et al (2014)¹, Ektasyal etal (2016)².

In our study, most of the patients who came to our department inflicted with various type of ocular trauma were males (78.50%). This is in accordance with the previous studies conducted by Karaman et al (2004)³, Shivanand B patil et al (2016)¹, Maurya et al⁴ (2019). This could be explained by more active outdoor activities performed by male gender in present scenario, making them more susceptible and health seeking community of our population, requiring more amount of medical and surgical intervention.

Our study shows unilateral ocular injuries (90.11%) more common than bilateral (9.89%) with no significant difference between right and left eye. Road Traffic Accident (RTA) (34.07%) were found to be the most common mode of trauma specially among males followed by assault (26.66%). Sport related and work related injuries are found to be equal (12.22%). Similar findings were observed in studies by Shivanand B patil et al (2014)¹ and Prachee Nagrale et al (2015)⁵.

Most of the patients (36.26%) presented within 6-24 hours after injury and 24.81% in less than 6 hrs, highlighting increased awareness among people to seek early medical intervention for ocular trauma. Similar studies regarding presentation within 24 hour after injury are Ektasyal et al (2018)², Maurya et al (2019)⁴. In our study, closed globe injuries due to blunt trauma predominated (69.26%) and only 30.74% injuries were open globe. This was consistent with studies by Karaman K et al (2004)³, Mehul shah et al (2008)⁶.

Ocular adnexa (75.5%) were predominately affected in ocular injuries with periorbital edema or ecchymosis (50.37%) being most common followed by lid laceration (41.48%) and lid abrasion (26.66%) similar to studies, Alam J et al (2014)⁷, Kumarasamy et al (2016)⁸ whereas sclera was affected in least (10%). Conjunctiva (47%) was the second most common structure to be involved with subconjunctival haemorrhage (35.55%) being most common clinical presentation followed by chemosis (26.66%). Cornea (42.5%) and Iris (43.5%) were affected in almost equal proportions, presenting commonly as corneal edema (9.62%), corneal foreign body (7.77%) and iris prolapse (16.82%) respectively. Similar results were seen in study of Mela et al (2005)⁹, Manhas et al (2019)¹⁰. Traumatic cataract (8.14%) was the most common finding followed by subluxated or dislocated lens (2.59%) in patients with lens related injuries. Similar results seen in study of Wong et al (2002)¹¹.

Among anterior chamber (36.6%) involvement, traumatic hyphema (17.03%) was found to be most common presentation. Angle recession (7.77%) was second and traumatic hypotony (11.85%) was third most common finding. In our study, retina was the most common structure affected in posterior segment injuries (34.81%). Presenting, predominantly as retinal detachment (9.62%) followed by Berlin's edema (4.44%). Cox et al (1980)¹² reported that 12% of traumatic retinal detachment occurred immediately and 30% within one month of injury. Vitreous involvement was seen in 14.07% cases with vitreous hemorrhage in 12.96% cases. Endophthalmitis was found in 2.96% of studied

patients and was more commonly due to lacerated wound which was same as Hooshangfaghihi et al (2012)¹³.

5. Conclusion

Ocular trauma still remains a common and preventable cause of ocular morbidity. The commonest age group affected is that of young adult males. The commonest type of injuries being closed globe injuries affecting the anterior segment of the eye. The visual outcome depends upon severity of the injury and the time taken for reporting to a speciality eye care centre. Effective mass education is needed for prevention of ocular injuries and seeking early medical help. Eye care programmes need to consider ocular trauma as a priority in the rural population.

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