ejpmr, 2019,6(9), 336-340

SJIF Impact Factor 4.897

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

CLINICAL PROFILE OF OCULAR BLUNT TRAUMA

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Article Received on 27/06/2019 **Article Revised on 18/07/2019** **Article Accepted on 07/08/2019**

ABSTRACT

Objectives: To study clinical profile of blunt trauma to the eye and its consequences and to analyse the role of OTS in predicting final visual acuity. **Methods and Materials:** A prospective observational study was conducted on blunt ocular trauma patients attending the casualty and OPD of a tertiary care hospital. A detailed history and ophthalmological examination along with ultrasound B scan , X ray orbit, CT/MRI brain and orbit, visual evoked potential was done in relevant cases. **Results:** We studied 109 eyes of 100 patients with blunt trauma, majority were males (79%) in the age group 20-30 years. Injury was mainly due to road traffic accidents (55%). Blunt trauma mainly involved the anterior segment of the eye, periorbital and superficial ocular structures in 76.6%, cornea 16.8%, iris 9.2%, pupil 42.2%, hyphema 6.4%, lens 8.2%. Posterior segment involvement included vitreous haemorrhage in 4,5%, macular oedema in 5.5%, retinal detachment in 2.8%, traumatic optic neuropathy in 13.7%. Cranial nerves (3^{rd}, 4^{th}, 6^{th}, 7^{th}) were involved in 25 eyes. Initial visual acuity was >=6/12 in 60.6% of patients, visual acuity <6/60 was noted in 22.9% of patients. A significant correlation was found between the final vision of patients in our study and the estimated probability of visual outcome of the OTS study. **Conclusion:** Blunt ocular trauma is of high risk in age group of 20-40 years, especially males, most common mode of injury being vehicular accidents. OTS study helps to aid in providing information about prognosis.

KEYWORDS: Blunt trauma, ocular injury, ocular trauma score, road traffic accidents, traumatic optic neuropathy, visual acuity.

INTRODUCTION

Traumatic eye injury constitutes 7% of the traumatic body injuries and it forms 10-15% of all eye diseases.[1] Ocular trauma comprises a considerable workload for ophthalmic care and accounts for roughly 38% to 52% of all new patients presenting to the "accident and emergency/casualty" of a hospital.[2]

Ocular trauma especially affects children and the working population and it can cause loss of vision and the eye, though it is a preventable public health problem.[3] In public health, the scientific approach to ocular injury, is emerging as an interesting area for field research.[4] Also, the economic burden of ocular injuries is considerably high.[5]

Several factors determine the prognosis of ocular trauma, none of which are standardized. Ocular trauma scoring (OTS) was developed by United States Eye Injury Registry(USEIR) as an aid in prognosis, counselling and management of ocular injury cases. We can predict the visual recovery at the time of presentation by prognosticating the effect of blunt trauma to the eye.[6]

Ocular injury is a major health problem in India,[7] blunt trauma being an important cause of ocular morbidity and blindness.[8]

MATERIALS AND METHODS

100 patients with blunt trauma to the eye and head presenting to casualty and OPD from November 2017 to April 2018 were considered for the study.

Inclusion Criteria- (1) old and fresh ocular blunt trauma (2) cases of head injuries leading to ocular manifestations.

Exclusion criteria -(1)penetrating injuries (2) chemical injuries (3)pre existing ocular pathologies affecting visual acuity (4) history of any previous intraocular surgeries.

An informed consent was obtained from each patient. The patients' demographic details including mode, time and site of injury, time of presentation and symptoms were documented.

Each patient underwent a thorough ophthalmological examination which included Visual acuity(VA) using the Snellen's chart, Ocular movements, Pupillary reflexes, Slit Lamp Biomicroscopy, Indirect ophthalmoscopy and intraocular pressure.

Investigations like X ray anterio-posterior and lateral view, B-scan, CT scan of orbit with 1-2mm cuts and brain, MRI orbit and brain were done in necessary cases. Each patient was assigned an Ocular trauma score (OTS) calculated from raw points and the OTS category was derived.

All patients were given treatment as per the need. Patients were followed up at 1 week, 1 month, 3 months and 6 months. Visual acuity was recorded each time along with other vital ophthalmological examination.

Statistical Software used was namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12 and R environment ver 2.11.1 were used.

RESULTS

Patients age ranged from 16 to 62 years with mean age of 31 years. Patients in the age group 20-30 were commonly affected (34%) followed by age group 31-40 years(21%). Males were more affected.

Road traffic accidents (RTA) were the most common mode of injury. (Table 1)

The eye was the site of blunt trauma in most cases(72%) and head injury comprised the rest (28%) of the cases. Right eye was involved in 59 eyes(54.1%). In 9 patients both eyes were involved. 87 % of patients presented within 48 hours of injury occurrence.

Visual acuity of >=6/12 was seen in 66 eyes(60.6%). 25 eyes (22.9%) had severe loss of vision(<6/60 vision) at presentation. (table2)

Ptosis was present in 16 eyes(14.6%). Periorbital ecchymosis was seen in 84 eyes(77%). 75 eyes(68.8%) had subconjunctival haemorrhage and 24 eyes (22%) had retrobulbar haemorrhage. Corneal involvement was present in 19 eyes (17.4%). 7 out of 109 eyes had hyphema(6.4%)

Most common pupillary change was traumatic mydriasis seen in 20 eyes(18.3%), followed by relative afferent pupillary defect(RAPD) in 16 eyes (14.6%) and internal ophthalmoplegia in 10 eyes(9.2%).

10 eyes (9.2%) had traumatic iridocyclitis. 9 eyes (8.2%) had traumatic cataract.
5 eyes (4.5%) had vitreous haemorrhage. Traumatic Optic Neuropathy was seen in 15 eyes(13.7%). 6 eyes (5.5%) had macular oedema. 3 eyes (2.8%) had traumatic retinal detachment.
11 eyes (10.1%) had combined 3rd and 6th cranial nerve involvement. Isolated 3rd cranial nerve involvement was seen in 9 eyes(8.2%), 6th cranial nerve in 5 eyes (4.6%).
30 eyes(27.5%) had orbital wall fracture.
12 eyes (11%) had restricted extraocular movements after 3 months.

Table 1: Distribution according to mode of injury.

Mode of Injury	No. of patients	Percentage
Road traffic accident	55	55
Domestic	21	21
Occupational	13	13
Others	11	11
Total	100	100

Table 2: Distribution of Eyes According to Visual Acuity at Presentation.

VA at presentation	No. of eyes	%
NLP	2	1.8
LP TO HM	11	10.1
CF1m TO <6/60	12	11
6/60 TO 6/15	18	16.5
>=6/12	66	60.6
TOTAL	109	100.0

Table 3: Distribution of visual acuity at presentation, after treatment, at 3 months and at 6months.

Visual Acuity	At presentation	After Treatment	At 3 months	At 6 months	% change
NLP	2(1.8%)	2(1.8%)	2(1.8%)	2(1.8%)	0.0
LP to HM	11(10.1%)	0(0%)	0(0%)	0(0%)	-10.1%
CF1M TO <6/60	12(11%)	15(13.7%)	8(7.3%)	8(7.3%)	-3.7%
6/60 TO 6/15	18(16.5%)	15(13.7%)	14(12.8%)	13(11.9%)	-4.6%
>=6/12	66(60.6%)	77(70.6%)	85(77.9%)	86(78.9%)	+18.3
Total	109(100%)	109(100%)	109(100%)	109(100%)	-

66 eyes (60.6%) had OTS score of 92-100, followed by 14 eyes (12.8%) of score 66-80. Poor OTS score (0-65) was seen in 11 eyes (10.1%). OTS score evaluation was not applicable in 5 eyes(4.6%).

Table 3 shows visual acuity at presentation, after treatment, at 3 and 6months. Improvement is significant at P<0.001, paired proportion test.

Final visual acuities in our study and estimated probability in OTS study were significantly comparable (P<0.001) (table4).

Table 4: Comparison of final visual acuities and OTS categorical distribution between OTS study and our study.

OTS Score	OTS Category	No. of eyes	Visual Acuity at 6 months evaluation(%)				
			NLP	LP to HM	CF1m to <6/60	6/60 to 6/15	>=6/12
0-44	1	1	73*/100	17*/0	7*/0	2*/0	1*/0
45-65	2	10	28*/10	26*/0	18*/50	13*/20	15*/20
66-80	3	14	2*/0	11*/0	15*/7	28*/71	44*/21
81-91	4	13	1*/0	2*/0	2*/0	21*/0	74*/100
92-100	5	66	0*/0	1*/0	2*/0	5*/0	92*/100

*Refers to OTS Reference study values, **Bold** numbers refer to our study values

DISCUSSION

Ocular injuries are the most common cause of monocular loss of vision worldwide.[1] Ocular injury is a preventable cause of blindness, yet remains a significant disabling health problem that affects all age groups. Blunt injuries can occur at home, the work place, while engaging in sports and recreational activities or due to road traffic accidents.[9]

In our study 109 eyes of 100 patients were enrolled. The majority of patients were in the age group of 20-30 years with mean age of 31 years. In a similar study conducted by S. Vats et al,[8] the mean age was 24.1 years and in a study by Turgut B et al, mean age was 24.7 years.[10]

As per studies by Tielsch and Klopfer, the general pattern of risk presents a bimodal curve with peaks seen at the two extremes of life. The first peak is in the age group of 5-25, and a second one in the 70 and above age category.[11,12]

In our study, 79% of the patients were males. Gender is also a significant risk factor when ocular trauma is considered. All the well-designed population-based studies and case series reviewed for this article reported higher incidence of eye injury among men than women, especially in the younger ages.[13,14,15]

Our study further supports previous studies showing that most of the patients involved were young males who maybe the only earning members of their families. This adds to the economic burden of ocular trauma. A report by Duke Elder[16] and Werner[17] showed that the incidence of ocular injuries is higher in males as they are more exposed to outdoor and occupational hazards.

Motor Vehicle accidents (55%) were the main cause of blunt trauma in our study, co-relating with Crompton M.R et al [18] and Malik et al study[19] who also had RTA as the main cause of injury.

In statistics, road traffic accidents(RTA) tend to be more evident because they are usually better reported.[4]

Studies by D.V. Singh et al[20] and Turgut[10] et al showed domestic accidents as the most common cause of ocular injury.

In our study, though only 10% were occupation related, none of them wore any protective eye gear. In our series the incidence of non occupational ocular injuries were 90, as against 10 under occupational causes. In the field of occupational medicine and work-related eye injuries, for example, there is evidence that longer hours at work, and hence fatigue, in poor working environments (poor lighting, lack of safety precautions etc.) raise the risk of occurrence.[4]

In our study, the BCVA was >=6/12 in 60.6%. In prospective survey by Macewan C.J. et al, 77% of cases had BCVA >=6/12.[21] Majority of the injuries in our study as well as the reference study were periorbital. In a study by Joseph et al seven percent of eye injuries resulted in blindness, 22% were serious (visual acuity between 20/40 and 20/200 or eye injury requiring surgery), and 71% were temporary (final visual acuity of 20/40 or better).[22]

In our study periorbital ecchymosis and sub conjunctival haemorrhage (76.6% and 69.2%) respectively were common findings. Studies by Macewan C.J. also showed 98.3% of all injuries involving periorbital and superficial ocular structures.[21] Moshetova et al in their study of blunt injuries to the eye, showed that the most common complication of such type of injury was hemorrhage to the anterior chamber, or hyphema, in 57.6% of the cases.[23]

Corneal involvement seen in 16.8% included abrasions, lamellar lacerations and odema. Corneal abrasions healed within 3 days. In our study traumatic hyphema was seen in 4.7% of cases, angle recession glaucoma was seen in 3 eyes.

In this study, 10 eyes (9.2%) had traumatic iridocyclitis and 9 eyes (8.2%) had traumatic cataract. In a study by Canavan et al, iris abnormalities were found in 37.3%, the most common abnormalities being marginal tears and pupillary defects. Cataract or lens dislocation was seen in 24.5% of eyes, but majority of the lens opacities were localised, stationary, and not associated with significant vision loss.[24]

In a study by Rajendra P Maurya et al, which evaluated ocular trauma in university students, showed that 12.5% cases had hyphema and about 8 cases (4.82%) had lenticular opacities due to blunt ocular trauma.[25]

In this study, posterior segment was involved in 36 eyes (33.6%). This is in line with a study by Eagling E.M. et

al in which had 37 patients (34.2%).[26] In this study 5 eyes(4.7%) had macular odema, 4 eyes(4.7%) had vitreous haemorrhage, and 3 eyes (2.81%) had retinal detachment. Lima Gomez et al, in their work had shown, retinal detachment in 6 eyes and endophthalmitis in 2 eyes.[27]

In our study, traumatic optic neuropathy was seen in 14 eyes(13.1%) of which 12 (85.7%) eyes had TON. One patient presented with NO Light Perception(NLP) due to optic nerve damage caused by impingement of bone spicules. This patient's Visual evoked potential (VEP) showed severe conduction deficit. The frequency of TON in our study is higher than those in studies by Steinsapir et al, where frequency of optic nerve injury occurring in closed head injury varies from 0.5% to 5%.[28] This could also be due to high incidence of road traffic accidents with increasing vehicular traffic and driving at high speeds.

In this study, among other nerves involved, the combined 3rd and 6th cranial nerves were involved in 10 eyes (9.3%), followed by isolated 3 rd cranial nerve in 9 eyes(8.4%), 6th cranial nerve in 5 eyes(4.7%) and isolated 7th cranial nerve in 1 eye(1%).

According to Turgut B. et al 40 eyes (35.1%) had an OTS score in the range of 66-80. Poor OTS score was seen in 48 eyes (42%) eyes.[10]

The comparison of final visual acuities of patients in our study and the probability which was estimated of the follow up visual acuity by the OTS study was found to be statistically significant. This showed that the OTS correlated with the final visual acuities of patients. OTS was found to be applicable in 95% of patients with ocular trauma. Therefore, the added value of applying such a scale could be obtained at primary care level. One limitation perhaps to the application of OTS is the inability to evaluate the visual function, either because patients may not be alert or due to other injuries that do not allow evaluation.

Cao et al also reported in their study that the OTS correlated with the final visual acuity of the patients.[29]

The OTS scoring is frequently used in open globe injuries compared to closed globe injuries. However, OTS study can predict the final acuity of vision which has a greater importance for patients with traumatic eye injury and their treating ophthalmologists. OTS uses a restricted number of variables which can be determined at the time of initial examination in order to predict the final functional outcome in upto 70%-80% within a particular visual category.

CONCLUSION

Blunt ocular trauma is of high risk in age group of 20-40 years, especially in males, the most common mode of injury being RTA. These comprise of the working and student class who have to shoulder many responsibilities and earn a livelihood for which their vision is of paramount importance. Hence we need spread awareness in these age groups regarding eye injuries, its consequence and measures for prevention such as wearing eye protection devices at work place, protective head gear while riding two wheelers and prompt visit to the eye care centres.

This study proved that ocular trauma scoring system is a useful system for both ophthalmologists and patients to provide information about results of injury and prognosis. A high value in OTS provides us with quantitative data that indicates better progress. However further studies including large case numbers similar to those of OTS are needed to use the scoring system worldwide for visual prognostics evaluation of eye injuries.

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