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Original Research Article

Ocular Trauma Score (OTS): A Method to Predict the Visual Outcome of Patients after Ocular Trauma

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Abstract

Aim: A prospective study to evaluate the predictive value of ocular trauma score in cases of mechanical eye injuries in a tertiary care hospital.

Methods: This prospective observational study was carried out in the Department of Ophthalmology, Anugrah Narayan Magadh Medical College Hospital (ANMMCH), Gaya, Bihar, India for 1 year. 100 patients who presented to our tertiary care centre with mechanical eye injuries

Results: Out of 100 patients mean age was 29.46 years, with majority between 21 to 50 years of age. Males were 76% and 24% were females. Most injuries (90%) were unintentional while only 10% were due to assault. The inflicting agents in 52% were metallic object, in 31% wood. In 11% road traffic accident was the aetiology while broken glass was responsible in 2%. 13 eyes (13%) presented with lid laceration and in 67(67%) eyes hyphema was present. Traumatic cataracts developed in 21 eyes (21%). Vitreous loss was noted in 25 (25%) eyes. Intra-ocular foreign body was detected in 3 (3%) eyes. Out of 100 eyes 84 eyes affected with globe rupture (84%), 7 with retinal detachment (7%), RAPD noted in (7%) and 2 patient showed signs of endophthalmitis (2%). The initial visual acuity was no perception of light in 25% (25 cases), hand movement or perception of light in 64% patients and 2 patient (2%) had vision between 1/200 to 19/200.

Conclusion: Ocular trauma in any age creates agony in patient and family. Just after trauma the question treating team faces is how much visual damage is and how it will evolve in future. This question is more haunting in era of consumer protection act. OTS helps to row the boat of prognosis amidst the storm.

Keywords: Ocular trauma, scoring, visual acuity, mechanical injuries.

Introduction

Ocular trauma has currently gained attention due to its serious impact on visual morbidity [1]. Ocular trauma is a major cause of monocular blindness and

visual impairment throughout the world [2,3].

Ocular trauma score (OTS) was proposed to predict the visual outcome of patients after ocular trauma [4]. In 2002 the ocular trauma score (OTS) was published, which estimates visual function (visual acuity) after 6 months of ocular trauma. This OTS scale is useful for guiding the treatment and rehabilitation of the patients with eye injury and to provide the valuable information and advice. According to this OTS scale, the traumatized eye may be placed into one of five categories (Globe rupture, Endophthalmitis, perforating injury, Retinal Detachment and RAPD), each of which has a distinct probability of reaching a range of visual function [4].

Variables which can be identified easily and affect the visual outcome directly are included as deciding factors of OTS. They are visual acuity, globe rupture, endophthalmitis, perforating injury, retinal detachment and RAPD. Each variable was assigned a number called raw points. If variables are not present, its value is zero. Raw points are added to get a raw score. This raw score helps in getting the final OTS (1 to 5) from standard table. After complete examination and investigation of a case of mechanical eye injury, depending on vision and anterior- posterior segment findings, we get raw points. Raw points are summed up to get a raw point score. It is simply like any sports score or exam marks of different subjects; good score guide to victory but in spite of poor score, there does remain hope of winning at last. OTS score of one (0-44 raw point sum) will have poor final visual outcome at 6 months while the OTS score of five (92-100) will have better final vision outcome.

Purpose of this study was to evaluate the predictive value of ocular trauma score (OTS) in cases of mechanical eye injuries and to study the profile of ocular trauma in a tertiary care hospital.

Material and methods:

This prospective observational study was carried out in the Department of Ophthalmology, Anugrah Narayan Magadh Medical College Hospital (ANMMCH), Gaya, Bihar, India, India for 1 year.100 patients who presented to our tertiary care centre with mechanical eye injuries

Methodology

The findings about significant history and ophthalmic examination were recorded in pre-designed Proforma. The important variables for OTS visual acuity, globe rupture, endophthalmitis, perforating injury, retinal detachment, relative afferent pupillary defect (RAPD) were given special emphasis during initial examination. On first examination each eye was assigned an initial raw score based on the initial visual acuity (VA), anterior and posterior segment finding. Once the raw score sum has been calculated, from the relevant category the eye got corresponding OTS score (Table 1). For each OTS score Table 1 gives the estimated probability of each follow-up visual acuity category. Proper treatment was given to each patient. Initially they were closely followed weekly for 1st month, every forth night for next two months. Finally, they were called for final ocular examination to record vision at 6 months.

Results:

Out of 100 patients mean age was 29.46 years, with majority between 21 to 50 years of age. Males were 76% and 24% were females. Most injuries (90%) were unintentional while only 10% were due to assault. The inflicting agents in 52% were metallic object, in 31% wood. In 11% road traffic accident was the aetiology while broken glass was responsible in 2%. 13 eyes (13%) presented with lid laceration and in 67(67%) eyes hyphema was present. Traumatic cataracts developed in

21 eyes (21%). Vitreous loss was noted in 25 (25%) eyes. Intra-ocular foreign body was detected in 3 (3%) eyes (Table 2).

Out of 100 eyes 84 eyes affected with globe rupture (84%), 7 with retinal detachment (7%), RAPD noted in (7%) and 2 patient showed signs of endophthalmitis (2%).

The initial visual acuity was no perception of light in 25% (25 cases), hand movement or perception of light in 64% patients and 2 patient (2%) had vision between 1/200 to 19/200.

Table 1: Estimated probability of follow up visual acuity category at 6 months

Raw score sum	OTS score	Npl	Pl/hm	1/200-19/200	20/200-20/50	>=20/40
0-44	1	74%	18%	7%	2%	1%
45-65	2	29%	27%	19%	14%	16%
66-80	3	2%	12%	14%	29%	45%
81-91	4	1%	2%	2%	22%	75%
92-100	5	0%	2%	2%	5%	93%

2: Demographic distribution of patients

Demographical Distribution	Number of patients	Percentage (n = 100)
Age		
5-20 years	37	37
21-50years	46	46
51-70years	17	17
Gender		
Male	76	76
Female	24	24
Source of injury		
Metallic object (iron rod and nail)	52	52
Wood, bamboo stick and thorn	31	31
Road traffic accident	11	11
Broken glass	6	6
Associated factors		
Lid laceration	13	13
Hyphema	67	67
Traumatic cataract	21	21
Vitreous loss	25	25
Intraocular foreign body	3	3

Table 3: Distribution of the variables of the OTS in our sample population (n = 50)

Variables A. Initial visual acuity	N	%
No PL	25	25
PL or HM	64	64
1/200 to 19/200	2	2
20/200 to 20/50	9	9
>/= 20/40	-	-
B. Globe rupture	84	84

C. Endophthalmitis	2	2
D. Perforating injury	-	-
E. Retinal detachment	7	7
F. Relative afferent pupillary defect	7	7

Table 5: Comparison of final visual acuities and OTScategorical distributions between OTS study and our series

Sum of Raw Points	OTS score	NPL	PL/HM	1/200-19/200	20/200-20/50	>/=20/40
0–44	1	75/77.8	16/22.2	8/0	3/0	1/0
45-65	2	28/8.1*	27/54.1*	19/13.5	16/13.5	16/10.8
66-80	3	2/0	12/0*	16/25*	32/50*	42/25*
81-91	4	1/0	2/0	3/0	23/0*	74/0*
92-100	5	0/0	1/0	1/0	5/0	95/0*

Our study goes much in consensus with OTS described. This study showed few variations (Table 4) like in the category 2 where the NPL ratio was 28% vs. 8.1% and PL/HM was 27% vs. 54.1%. This difference may be because of vision recording is a subjective test and is totally dependent on the status of patient how they respond in traumatised phase while suffering in pain and agony. Sometimes response of patient may be inaccurate. Conventional OTS has been given at that time, when the enucleation was preferred practice in severe trauma for fear of sympathetic ophthalmitis. Now a day's enucleation rate is decreased as better treatment modalities are available. This could affect the results of this category.

Schorkhuber MM et al [5]. also founded statically difference of PL/HM ratio in category 2 (53% vs. 26%) and Unver et al [6]. have also highlighted that final visual acuity for PL/HM in category 2 (55% vs. 26%). The younger the child at the time of visual deprivation, the more rapid the development of Amblyopia [7,8]. In addition, children may develop more extensive postoperative inflammation, scarring, and proliferative vitreoretinopathy than adults which may also affect the anatomic and functional outcomes [9].

Another statically differences we founded in category 3 where 1/200-19/200 ratio (16 vs. 25%; P value: 0.041) and 20/200-20/50 ratio (32% vs. 50%; P value: 0.003) were statistically higher than in the OTS study because in our study many patients presented to us with pupil sparing trauma like small, incised wound in peripheral cornea and peripheral corneoscleral tear. After repairing of peripheral wound, vision of patients has improved. Many patients were there with traumatic cataract in which vision improved after cataract surgery. Some patient's vision improved after hyphema gets resolved. Technically good surgical repair of wound also caused the vision to improved post-operatively. Qi Y et al [10]. concluded that the prognostic factors were initial VA, wound location, injury type, cataract removal procedure, and the way of IOL implantation and suggested that the OTS has good sensitivity and specificity for predicting visual outcome in traumatic cataract patients in long follow-up.PL/HM ratio (12% vs. 0%; P value: 0.011), and >=20/40 ratio (42% vs. 25%; P value: 0.03) were statistically lower than in the OTS study because various factors such as age of patient, presence of total body injury, cause of injury, type or mechanism of injury, presence of intraocular foreign body, expulsive haemorrhage, extent of

wound and size of open globe injury, location of open globe wound, lens damage, hyphema, vitreous haemorrhage, patients from rural background, may have affected our study

We found that most open globe injuries in males involved in manual work. Now the high rate of work-related injuries is alarming. This indicates there are still a number of companies and construction sites hiring labours do not prioritize ocular protection as part of their occupational health and safety project. These labourers usually belonging to the lower socio-economic status do not give attention on the day of injury and take no medical advice most patients waited for 1 to 3 days before coming for consultation, consistent with the previous study [11]. This could be due to financial constraints and transportation difficulties. Later most patients underwent some form of surgical intervention in addition to medical therapy directing towards the severity of injury.

Based on mode of injury, blunt injury cases had poor final VA compared to penetrating trauma in our study. This can affect the internal structures of the eye by coup-countercoup mechanism resulting in more significant damage and similarly significant injury to optic nerve. With blunt injury, wound can get extended posterior to recti insertion resulting in poorer final vision outcome.

Our study showed majority of patients with initial VA of PL/HM or worse had comparatively good final Visual Acuity. This may be due to traumatic cataract lens removal and good surgical repair of globe and treatment modalities. If the complications like endophthalmitis and retinal detachment develop in later phase of trauma, the value of OTS in predicting pre-operative evaluation of open globe injury is uncertain. In our study most of patients presented to us with open globe injury (globe rupture) it was found to be statically significant.

Visual outcome also depends on the age of patient, type or mechanism of injury, extent of wound and size of open globe injury, location of open globe wound, lens damage, hyphema, vitreous haemorrhage, presence and type of intraocular foreign body. These factors can be responsible for drastic differences in later visual outcome contrary to what is predicted by conventional OTS. As these factors are not mentioned in detail they should be considered in conditions when present. As far as the pre-existing scoring systems are concerned, its applicability is limited in open globe injuries in children. The OTS utilizes a limited number of variables and basic statistics to give the ophthalmologists a 77% chance of predicting the final visual outcome within (plus or minus) one visual category shortly after the eye injury [12].

Conclusion:

Ocular trauma in any age creates agony in patient and family. Just after trauma the question treating team faces is how much visual damage is and how it will evolve in future. This question is more haunting in era of consumer protection act. OTS helps to row the boat of prognosis amidst the storm.

OTS provides the reliable information for ophthalmologists and patients about the prognosis in case of ocular trauma. It helps in deciding the therapeutic approach for practicing ophthalmologists involving the patient and the family.

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