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Editorial

Importance of ocular trauma score (OTS) system

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Ocular trauma is an important reason of reduced quality of life. It is one of the leading cause of ocular morbidity and monocular blindness in the world, with open globe injury (OGI) constituting a major portion of trauma related vision loss.[1] Major ocular injury can result in both severe physical damage and psychological trauma for patients and their family. Eye trauma constitutes 7% of all bodily injuries and 10–15% of all eye disease.[2,3] Approximately 750,000 cases of ocular trauma are hospitalized each year, with 203,000 open globe injuries per year worldwide.[4,5] Despite public health campaigns designed to prevent eye injuries, open globe injuries still occur.[6,7] Successful surgical repair of open globe injury and subsequent visual rehabilitation is a topic of great significance and challenge to the practicing ophthalmologists.[8] One of the important components in management of open globe injury is counselling of the trauma victim and his family.[8] Even though, with advent of new modalities and improved technology the management of penetrating ocular injuries has changed,[8] we need to counsel and prognosticate any patient with ocular trauma before and even after the repair of open globe injury.

To predict the vision outcome in ocular trauma patients, there have been numerous literature till date.[9–12] International classification of ocular trauma is based on some of the variables affecting the final visual outcome.[10] Ocular trauma score (OTS) system suggested by Kuhn et al., is the current system to predict the vision outcome in patients with open globe injury.[11] Kuhn et al., analyzed more than 2500 injuries from the United States and Hungarian eye injury registries to identify the predictors of final vision outcome after open globe injury.[11] The OTS is calculated by assigning certain numerical raw points to six variables: initial visual acuity, globe rupture, endophthalmitis, perforating injury, retinal detachment, and relative afferent papillary defect (RAPD). The scores are stratified into five categories that give the probabilities of attaining a range of visual acuities post-injury.[11] There are very limited studies on validation of scoring system used by OTS.[9,12]

On initial examination, a raw score depending on the initial visual acuity was assigned. The final score was calculated by subtracting points, according to presence or absence of various predefined variables, from the initial raw score. The final score was matched to the relevant OTS group, ranging from 1 (most severe injury) to 5 (least severe injury) and are associated with a published range of predicted post-injury visual acuities, which correlates with an estimated probability of final visual acuity. A higher OTS score is typically associated with a better prognosis.[13,14]

It is believed that the OTS can provide objective information about the prognosis of patients with open globe injuries. Several studies have shown an increasing prevalence of ocular trauma with a bimodal distribution.[15] Males are six times more likely to be affected than females, and a recent report showed a shift from workplace to home as the place of injury.[4,16–19]

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Table 1: Original OTS variables and scoring [11]

Variables	Raw points
Initial visual acuity	
No light perception	60
Light perception/hand motion	70
1/200–19/200	80
20/200–20/50	90
<20/40	100
Rupture	−23
Endophthalmitis	−17
Perforating injury	−14
Retinal detachment	−11
Afferent pupillary defect	−10

The prognosis of ocular injury cases, while varied, has improved in recent years due to the development of microsurgical and vitreoretinal techniques;[18] however, a historical lack of standard protocols and terminology made it difficult to appropriately triage and manage patients. The management of open globe injury is driven by a desire to achieve the best possible long-term visual outcome, and having prognostic information is important for triaging decisions and counselling a patient and their family. Functional prognosis following ocular injury varies widely with various risk factors associated with poorer visual outcomes.[20,21]

The Birmingham Eye Trauma Terminology System (BETTS) is a widely accepted standardized system of categorizing ocular trauma terminologies that enables the accurate transmission of clinical information and study data.[10,22] However, the Ocular Trauma Score (OTS) is a simplified predictive tool for ocular trauma cases first described by Kuhn et al. in 2002.[5,11] It is based on BETTS and the features of globe injury at initial examination, with scores based on risk factors shown to be associated with visual outcomes. The score's predictive value is useful not only for counselling patients and families, but for managing expectations and guiding clinical decisions, particularly in resource-limited settings. Rationale for OTS being a reliable predictive tool would be valuable as the scoring system is classically used to predict the visual outcome of patients after 'open-globe ocular trauma' which by definition is a full thickness wound of the eye wall with the condition usually resulting in blindness.[23] Various studies have validated the OTS as a reliable predictive tool, with a predictive accuracy of up to 80%.[24,25]

OTS can be an accurate predictive tool for estimating final visual acuity even for a short follow up period of 3 months. It provides a better means for patient counselling and aids in clinical decision making. Functional prognosis following globe injuries varies widely, from NLP to normal vision. Previous studies on ocular trauma have identified the risk factors associated with poor visual outcome, including initial visual acuity, size, and posterior extent of the wound (zone of globe injury), the presence of an afferent pupillary defect, type of injury, presence of vitreous hemorrhage, presence of lens damage, presence of retinal detachment, and the presence of an intraocular foreign body and endophthalmitis.[26]

The importance of eye trauma has increased because of the relatively high rate of trauma in the pediatric age group. Various studies have reported that 20–50% of ocular injury admissions are children.[27,28] Eye trauma in children differs in many ways from that in adults. It is difficult to obtain sufficient information from children about how trauma occurs and they may not be aware of a reduction in their visual acuity. As such, diagnostic delay increases the risk of endophthalmitis. Even under the best conditions, because of the restlessness of children and communication problems, ophthalmic examination in children is very difficult, as compared with adults.

Visual development continues until the age of 9–10 years, and despite successful trauma treatment VA may not improve because of amblyopia. Traumatic cataract in children <5 years of age causing secondary deprivational amblyopia could cause a further decrease in the visual outcomes than just the injury itself. Even after appropriate diagnosis and treatment, the healing process in children is associated with dense fibrous tissue proliferation, and because of a longer life expectancy in children than in adults, it can lead to different visual consequences. Obviously, the same trauma in the eye of a child <5 years of age and in a patient 15 years of age does not affect the eye in the same manner. Hence, age factor was included in the POTS (Pediatric Ocular Trauma Score) system.

In a study conducted by Acar et al.[29] the POTS was used in pediatric (≤15 years of age) penetrating eye injuries (Table 2); it is similar to the OTS, but not the same. They classified injuries using that score and assessed relationship of the final VA and the POTS. The trauma score they used awards fewer points for initial VA than the OTS, in consideration of the probability of obtaining false initial VA scores or the inability to obtain VA scores in children ≤15 years of age. Likewise, relative afferent pupillary defect (RAPD) could not be evaluated in most of the cases in this study and was therefore not included in the scoring. Patient variables, such as age and wound location, were considered important parameters and were included in the scoring. The patients were divided into five groups (higher points is presumed to be better prognosis) based on the trauma evaluation score:

1. Group 1: <45 points.
2. Group 2: 46–64 points.
3. Group 3: 65–79 points.
4. Group 4: 80–89 points.
5. Group 5: 90–100 points.

Table 2: Calculating the POTS and raw points in this study

Variables	Raw points
Initial visual acuity	
NLP	10
LP/HM	20
Counting fingers	30
0.1–0.5	40
0.6–1.0	50
Age of the paediatric patients (years)	
0–5	10
6–10	15
11–15	25
Wound location	
Zone I	25
Zone II	15
Zone III	10
Concomitant eye pathologies	
Iris prolapse	−5
Hyphema	−5
Organic/unclean injury	−5
Delay of surgery (>48 h)	−5
Traumatic cataract	−10
Vitreous haemorrhage	−20
Retinal detachment	−20
Endophthalmitis	−30

Abbreviations: HM: Hand motion; LP: Light perception; NLP: No light perception; POTS: Pediatric penetrating ocular trauma score

The following equation was used to determine the trauma score in patients for whom an initial VA was not obtained: 2 X (age +zone) – corresponding pathologies.

The trauma score designed for pediatric patients with penetrating injury was strongly correlated with the predictability of final VA (P<0.001). As reported in many other studies, the most important factor that affected final VA in this study was initial VA (P<0.001); however, in preverbal children, especially from the affect of the trauma, it was difficult to determine VA, injury time, and shape of the injury. Because of these reasons; especially in the childhood, different classification need was born from the described classification in the literature on the basis VA. For this purpose, multi-center studies with larger series are needed.[27–29]

1. Conflict of Interest

None.

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