e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(9); 1079-1083

Original Research Article

Comparison of Ocular and Pediatric Ocular Trauma Scores in Predicting the Visual Outcome in Young Children with Penetrating Ocular Trauma at A Tertiary Care Hospital

Darshna Parihar[1], Ramesh Kumar[2], Ankur Kumar[3], Rakesh Porwal[4]

[1]Junior Resident, Department of Ophthalmology, JLN Medical College & Hospital, Ajmer, Rajasthan
[2]Associate Professor, Department of Ophthalmology, Dr SNMC, Jodhpur, Rajasthan
[3]Assistant Professor, Department of Ophthalmology, JLNMC, Ajmer, Rajasthan
[4]Professor and Head of Department, Department of Ophthalmology, JLNMC, Ajmer, Rajasthan

Received: 01-06-2025 / Revised: 15-07-2025 / Accepted: 21-08-2025
Corresponding author: Dr. Ankur Kumar
Conflict of interest: Nil

Abstract

Introduction: Pediatric ocular trauma is different from adult ocular trauma in many aspects, including mechanism of injury, initial assessment, and management protocols. Various ocular trauma scoring systems have been developed to allow for the prediction of final VA, like the Ocular Trauma Score (OTS) and the Pediatric Ocular Trauma Score (POTS).

Material and Methods: We performed a prospective clinical study over 18 months with children aged 1 to 15 years with penetrating ocular trauma. We aim to establish a trauma score that is more suitable in predicting the final visual acuity post-injury in the pediatric population.

Results: 100 patients met the eligibility criteria. A majority of the study population had a POT score of 1, which is 37%. 21%, 22% and 14% had a POT score of 2,3, and 4, respectively, while 6% had a POT score of 5. A majority, 64.3% had an OTS score of 3, followed by a score of 4 in 14.13%, a score of 2 in 13.04 percent and 5 in 6.52%. There was a statistically significant difference in the initial and final visual activity concerning counting of fingers and 0.1-0.5 across the various raw points based on the POTS Score. However, the difference was not significant when NLP, LP/HM, 0.6-1 were considered. When the OTS was considered, only Visual acuity of 20/200-20/50 showed statistical significance between the initial and the final values, $p<0.0001$.

Conclusion: As per our research, both the scores have good predictive value and can be used for assessing visual prognosis after pediatric open globe injury. The OTS score can be used in both open and closed globe injuries, whereas the POTS score is only applicable for penetrating eye injuries.

Keywords: Ocular Trauma Score, Pediatric Ocular Trauma Score, Penetrating Ocular Injury.

Introduction

Ocular injury is one of the common causes of acquired unilateral blindness in children. The consequences of childhood injury are harmful as they may lead to permanent blindness and visual handicap. It also affects the psychological, social, and emotional development of a child. Proper examination and diagnosis are crucial so that an appropriate functional prognosis can be made and timely management decisions taken accordingly [2]. Based on the Birmingham Eye Trauma Terminology System (BETTS), eye injuries were classified, and different ocular trauma scores were developed to assess the visual prognosis post injury, including the Ocular Trauma Score (OTS) and Paediatric Ocular Trauma Score (POTS). Using the eye injury registry databases of the United States and Hungary, Kuhn et al, developed the ocular trauma score (OTS) in 2002, a simplified categorical system for standardized assessment and visual prognosis in ocular injuries [3]. OTS scores range from 1 (most severe injury and worst prognosis at 6 months follow-up) to 5 (least severe injury and best prognosis at 6 months). Each score is associated with a range of predicted post-injury visual acuities, with some points that are difficult to assess in children, like VA at presentation and RAPD. Therefore, Acar and colleagues developed a pediatric ocular trauma score that downplayed presenting VA in its predictive model and removed RAPD [4]. In this system, fewer points are awarded for initial visual acuity than in the OTS to account for the probability of inaccurate or absent initial visual acuity measurements. It also provided an equation to allow for scoring when no initial VA

could be obtained: 2 x (age + zone) – corresponding pathologies. On reviewing the existing literature, we found conflicting conclusions regarding both the scores. We aim to establish a trauma score that is more suitable in predicting the final visual acuity post-injury in the pediatric population.

Subjects and Methods

Ethics: After obtaining written informed consent from patients or their relatives in the Department of Ophthalmology at J.L.N. Medical College in Ajmer [Rajasthan] and receiving clearance from the institution's Ethical Review Board, the research was carried out.

Statistical Analysis: The data collected will be entered into Microsoft Excel version, statistically analysed using SPSS version 22, and expressed as simple percentages and proportions. Data will be represented in the form of tables and analysed with the help of descriptive statistics.

Methods

Patients who presented themselves to the outpatient or emergency department of the J.L.N. Medical College in Ajmer, Rajasthan, with penetrating ocular trauma, aged 15 or under, were included in the study. Patient's history was recorded to determine the age, gender, eye involved, mode of trauma, and the patient was examined thoroughly to establish the presence of any concomitant eye pathologies. OTS and POTS scores were calculated for each of the study subjects. In our study, 8 children did not have recorded initial VA. Hence, OTS scoring was not possible in them, whereas POTS scoring was possible for all the patients through the equation.

Results

37% of the study population had a POT score of 1, which is the majority. 21%,22% and 14% had a POT score of 2,3, and 4, respectively, while 6% had a POT score of 5. A majority, 64.3% had an OTS score of 3, followed by a score of 4 in 14.13%, a score of 2 in 13.04 percent and 5 in 6.52%. There was a statistically significant difference in the initial and final visual activity concerning counting of fingers and 0.1-0.5 across the various raw points based on the POTS Score. However, the difference was not significant when NLP, LP/HM, 0.6-1 were considered. When the OTS was considered, only Visual acuity of 20/200-20/50 showed statistical significance between the initial and the final values, p <0.0001.

Table 1: POTS Score-wise distribution:

POTS Score grade	Number of patients	Percentage
1	37	37%
2	21	21%
3	22	22%
4	14	14%
5	6	6%
Total	100	100%

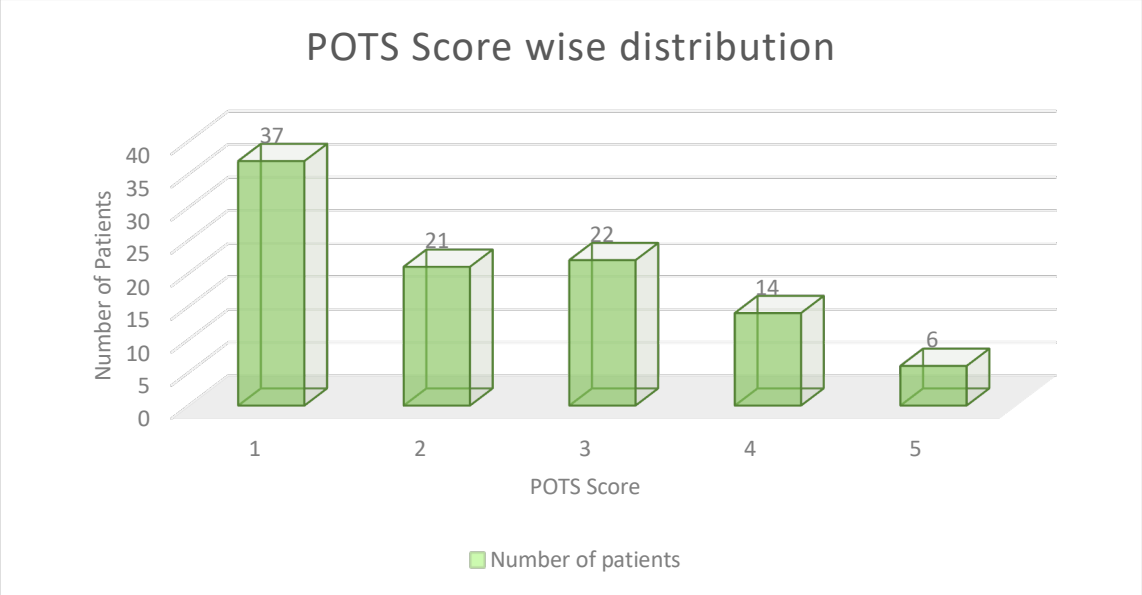

Chart 1: POTS Score-wise distribution:

Table 2: OTS Score-wise distribution:

OTS Score grade	Number of patients(N=92)	Percentage
1	2	2.17%
2	12	13.04
3	59	64.3%
4	13	14.13%
5	6	6.52%
Total	92	100%

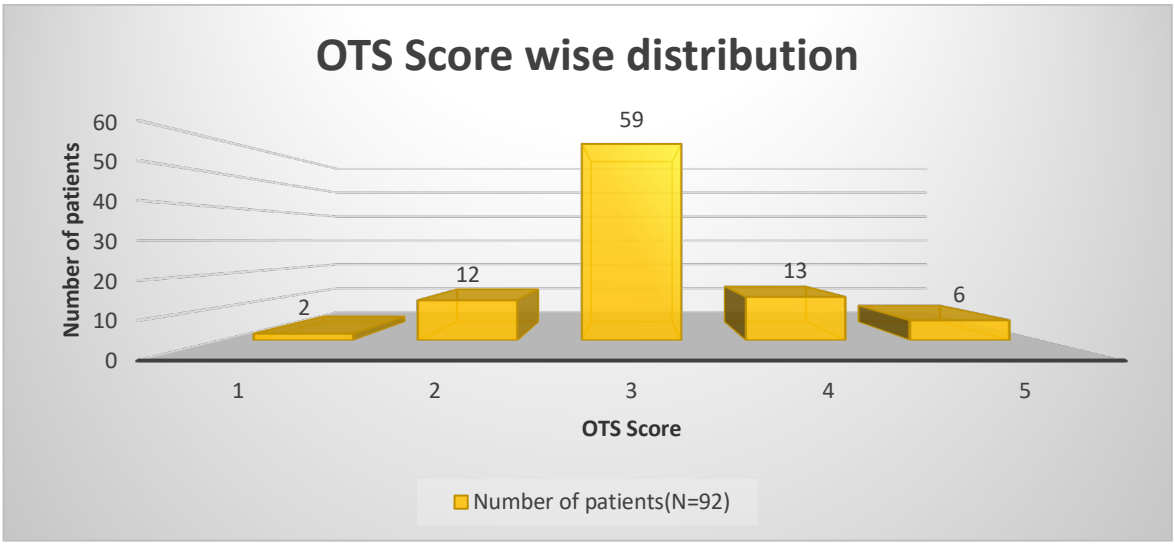

Chart 2: OTS Score-wise distribution:

Table 3: Comparison of Initial Visual Acuity Outcome and Final Visual Outcome based on POTS Score:

Raw Points	Grade	Number of patients (N=92)	NLP		LP/HM		Counting of fingers		0.1-0.5		0.6-1	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
≤45	1	33	2	6	25	17	5	8	1	4	0	1
46-64	2	21	0	0	8	0	13	6	0	11	0	4
65-79	3	18	0	0	3	1	12	2	3	11	0	8
80-89	4	14	0	1	0	0	3	0	9	3	2	10
90-100	5	6	0	0	0	0	0	0	4	0	2	6
Chi-square value			0.3214		5.089		8.545		22.792		3.272	
P value			0.5708 (NS)		0.0785 (NS)		0.0360(S)		0.0001 (S)		0.5135 (NS)	

Chi square test applied; S=Significant; NS=Not Significant

Table 4: Comparison of Initial Visual Acuity Outcome and Final Visual Outcome based on OTS Score:

Raw Points	Grade	Number of patients (N=92)	NLP		LP/HM		1/200-19/200		20/200 -20/50		≥20/40	
		Initial Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
≤45	1	2	1	1	1	1	0	0	0	0	0	0
46-64	2	12	1	5	10	5	1	0	0	2	0	0
65-79	3	59	0	0	25	10	32	14	2	23	0	12
80-89	4	13	0	1	0	0	1	0	6	0	6	12
90-100	5	6	0	0	0	0	0	0	4	0	2	6
Chi-square value			1.286		0.4729		0.8593		28.603		4.908	
P value			**0.5258 (NS)**		**0.7894 (NS)**		**0.6507 (NS)**		<0.0001 (S)		**0.0859 (NS)**	

Chi square test applied; S=Significant; NS=Not Significant

Discussion

Traumatic ocular injuries are an important cause of monocular blindness in young patients, as well as adults. With timely and prompt diagnosis and management, visual prognosis can be better. A majority, 35% of the study population had a POT score of 1. 22%, 19.5% and 15% had a POT score of 2,3, and 4, respectively, while 6% had a POT score of 5. A majority, 64.3% had an OTS score of 3, followed by a score of 4 in 14.13%, a score of 2 in 13.04%, 5 in 5.43% and 1 in 2%. In our study, the initial visual acuity at presentation was LP/HM in 36% followed by CF in 33 percent and 0.1 -0.5 in 17%. Only 2% had an initial visual acuity of NLP, whereas 0.6-1 was seen in 4%. The final visual acuity was 0.1-0.5 and 0.6-1 in 29% each, followed by LP/HM in 18% and CF in 16% .7% had NLP.

There was a statistically significant difference between the initial and the final visual acuity (p <0.0001(S). In the study by Silva-Filho GV et al [5], the initial VA at presentation was no light perception in two patients (6.7%), hand motion in one (3.3%), counting fingers in one (3.3%), between 20/200 and 20/40 in five (16.7%), >20/40 in one (3.3%); in 18 (60.0%). In the study by Howard Bunting et al, [6] the final best-corrected visual acuity was 20/40 in 56.5% of patients. Of the patients with a final best-corrected visual acuity >20/40, 58% were < 5 years of age at the time of injury, and in this younger subgroup, amblyopia was envisioned to be the cause of poor visual outcome in over half of the cases.

In our study, concerning initial visual activity, in those with a score of less than or equal to 45, a majority, 76% had a vision of LP/HM. In those with a score of 46 to 64, the majority, 61.9% had counting of fingers, while among those who had a score of 65 to 79, nearly 67% had counting of fingers. Among those who had a score above 80, the majority had a vision of 0.1 -0.5. With respect to final visual activity, in those with a score of less than or equal to 45, a majority, 47.22% had a vision of LP/HM. In those with a score of 46 to 64, the majority, 28.57% had counting of fingers, while among those who had a score of 65 to 79, nearly 37% had 0.6-1.

Among those who had a score above 80, the majority had a vision of 0.6-1. In some of the research in children, investigators have sought to pick out elements at preliminary evaluation of open globe damage that are probably related to a worse outcome. [7,8] Endophthalmitis, retinal detachment, and vitreous hemorrhage are strongly linked to less favourable outcomes. In the original OTS paper, Kuhn and colleagues [2] identified and stratified rupture, endophthalmitis, perforating injury, retinal detachment, and afferent pupillary defect as key risk factors predictive of prognosis.

Initial visual acuity was correlated with the final best-corrected visual acuity, but including the negative effect of these risk factors gave more accurate prognostic information. The authors did not specify whether or not children were included in the databases from which the method was formulated. Many of the variables in the POTS method appear to be selected without much significance, and the raw points designated to each variable lack statistical evidence.

Data from more than 2,500 patients was used to weigh the importance of factors included in the OTS calculation; by contrast, the sample size used to validate POTS was only 27 patients. In addition, POTS includes the zone of injury in the calculation, using a classification that applies to the adult-sized eye. The distance posterior to the limbus leading to a serious posterior segment injury would be considerably smaller in the youngest infants and would change with globe growth up to the age of 5 years. [9,10]

Conclusion

In our study, we found that both OTS and POTS may be useful predictors of final VA in paediatric open globe injuries. The OTS score can be used in both open and closed globe injuries, whereas the POTS score is only applicable for penetrating eye injuries.

References

1. Uysal Y, Mutlu FM, Sobaci G. Ocular Trauma Score in childhood open-globe injuries. J Trauma. 2008 Dec; 65(6):1284-6. doi: 10.1097/TA.0b013e31817de3cc.
2. Kuhn F, Maisiak R, Mann L, Mester V, Morris R, Witherspoon CD. The Ocular Trauma Score (OTS). Ophthalmol Clin North Am. 2002 Jun; 15(2):163-5, vi. doi: 10.1016/s0896 1549(02)00007-x.
3. Kuhn F, Maisiak R, Mann L, Mester V, Morris R, Witherspoon CD. The ocular trauma score (OTS). Ophthalmol Clin N Am. 2002; 15(2):163–5.
4. Acar U, Tok OY, Acar DE, Burcu A, Ornek F. A new ocular trauma score in pediatric penetrating eye injuries. Eye. 2011; 25:370–4.
5. Silva-Filho GV, Morgan-Kanada AM, Kasahara N. Predictive values of the Pediatric Penetrating Ocular Trauma Score and the Toddler/Infant Ocular Trauma Score in Brazilian children with open globe injury. Clin Exp Emerg Med. 2022 Mar; 9(1):41-46. Doi: 10.15441/ceem 21.092. Epub 2022 Mar 31. PMID: 35354234; PMCID: PMC8995519.
6. HowardBunting, Derek Stephens. Prediction of visual outcomes after open globe injury in

children: A 17-year Canadian experience. J AAPOS 2013;17:43-48
7. Gupta A, Rahman I, Leatherbarrow B. Open globe injuries in children: Factors predictive of a poor final visual acuity. Eye 2009; 23:621-5.
8. Grieshaber MC, Stegmann R. Penetrating eye injuries in South African children: Aetiology and visual outcome. Eye 2006; 20:789-95.
9. Singh S, Sharma B, Kumar K, et al. Epidemiology, clinical profile, and factors predicting final visual outcome of pediatric ocular trauma in a tertiary eye care center of Central India. Int J Ophthalmol. 2017; 65:1192.
10. Aiello AL, Tran VT, Rao NA. Postnatal development of the ciliary body and pars plana. A morphometric study in childhood. Arch Ophthalmol 1992; 110:802-5.