OCULAR TRAUMA SCORE IN OPEN GLOBE INJURIES INFLICTED ON TROOPS FIGHTING ON WESTERN FRONT OF PAKISTAN

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ABSTRACT

Objective: To determine the prognostic value of calculating ocular trauma score in open globe injuries inflicted on troops fighting on western front of Pakistan.

Study Design: Validation study.

Place of Study: Armed Forces Institute of Ophthalmology Rawalpindi, a tertiary care facility of armed forces.

Duration of Study: Sixteen months (January 2009 to May 2010).

Patients and Methods: A total of 48 cases, all male were examined and investigated. Their injuries were classified according to Birmingham Eye Trauma Terminology System (BETT). The ocular trauma score was calculated based on which patients were divided into categories 1 to 5. After appropriate treatment final visual acuity was noted at the end of six months which was then compared with estimated visual acuity as per Ocular Trauma Score group (OTS).

Results: A total of 48 males with mean age of 27.73 years (20-49 years) were included. On presentation the Best Corrected Visual Acuity (BCVA) of cases was NLP (no light perception) in 16.64%, LP/HM (light perception/hand motion) in 70.72%, CF-5/60 (count fingers) in 6.24%, 6/60-6/18 in 4.16% and > 6/12 in 2.08%. After calculating raw sum majority of the cases fell in categories 1 and 2 while there was no case in category 5. After treatment the BCVA recorded 6 months later was NLP in 18.72%, LP/HM in 64.48%, CF-5/60 in 6.24%, 6/60-6/18 in 8.32% and > 6/12 in 2.08%.

The observed frequencies of final visual acuity were then compared with the expected frequencies as per ocular trauma score group. It showed that our study had NLP significantly less and LP/HM significantly more than expected in categories 1 and 2.

Conclusion: In combat ocular trauma, Birmingham Eye Trauma Terminology System provides an unambiguous common language for sharing eye injury information and Ocular Trauma Score can be accepted as a reliable tool for providing prognostic information.

Keywords: Eye Injuries, Classification, Multiple Traumas.

INTRODUCTION

War theatre has expanded significantly since global declaration of war against terrorism. In this war, lethal wounds suffered by American soldiers were 10% whereas it was 18% in Pakistani soldiers[1, 2]. The incidence of eye injuries during United States war in Iraq was 13%. Improved body armour plays a vital role in protecting the soldiers from fatal chest or abdominal injuries but relatively exposed parts like face and eyes are still prone to trauma[3]. Combat ocular trauma (COT) makes a significant portion of multiple injuries suffered by Pakistan army soldiers and appears to be on a rise. Penetrating injuries are found in 27% of mine blast injury cases in young men of our forces[4].

Worldwide interest in ocular trauma is growing as increasingly effective interventional and preventive modalities are developed. The problem of unambiguous common language which remained a major limiting factor in effectively sharing eye injury information was solved by Birmingham Eye Trauma Terminology System (BETTS). This system satisfies all criteria not only by providing a clear definition for all injury types but also placing them within the framework of a comprehensive system. In BETTS all terms relate to the whole eye ball as the tissue of reference[5].

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After sustaining a serious ocular injury, patient's expectations regarding visual prognosis are highly important. However ophthalmologists around the world have little to base their prediction on. To solve this problem Ocular trauma Score (OTS) has been formed by United States Eye Injury Registry (USEIR) which works to estimate a special visual range by six months after injury. It is based upon visual acuity on presentation and vision-threatening injuries such as globe rupture, endophthalmitis, perforating injury, retinal detachment and afferent pupillary defect. Higher scores tend to indicate a better prognosis[6-8].

We have classified combat ocular trauma based on BETTS so that OTS can be calculated in our patients. This would significantly help us in determining the visual prognosis and long term disability of our war wounded soldiers.

PATIENTS AND METHODS

It was a validation study conducted at Armed Forces Institute of Ophthalmology Rawalpindi between January 2009 and May 2010. Prior to commencement, approval was taken by the institutional ethics committee. All patients included in this study sustained combat ocular trauma while performing their duties in war against terrorism on western front of Pakistan. Patients with history of eye injury or any ocular surgery before COT were excluded from the study. A total of 48 patients fulfilling the criteria were examined and investigated. Snellen's visual acuity, pupil response, slit lamp biomicroscopy, indirect ophthalmoscopy, ultrasonography (B scan) and CT scan were done. All injuries were classified in accordance with the BETTS. Main outcome measures were visual acuity, globe rupture, endophthalmitis, perforating injury, retinal detachment and afferent pupillary defect. The ocular trauma score was calculated by assigning a raw point value for initial visual acuity ranging between 60 and 100. Then appropriate raw points for each vision-threatening tissue injury (outcome measures) were subtracted from it. The final raw point was assigned a score between 1 and 5 as described by Kuhn et al[6]. Patients were hospitalized and managed. Surgical management was tailored according to each patient's requirements. Every case was then followed up monthly for six months. Final visual acuity was noted at the end of six months which was compared with estimated visual acuity as per OTS group.

Data had been analyzed using SPSS version 15. Descriptive statistics were used to describe the data. Chi-square test was applied to compare observed and expected frequencies in different categories and p value < 0.05 was considered as significant.

RESULTS

A total of 48 cases of combat ocular trauma were included in our study. They were all male soldiers of Pakistan army with mean age of 27.73 years (sd = 5.61). Average score was 46.79 (sd = 15.12, range 23-86). Ocular injuries at presentation are given in fig-1.

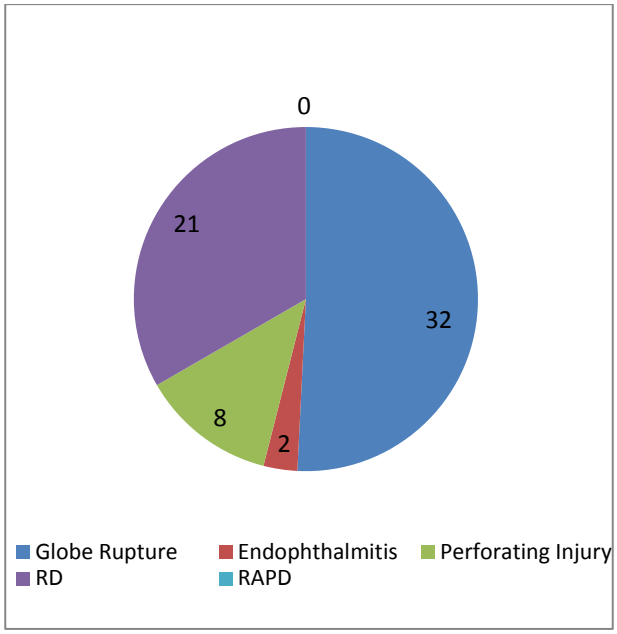

Figure-1: Various ocular injuries on presentation (n=48).

On presentation the BCVA of cases was NLP in 16.64%, LP/HM in 70.72%, CF-5/60 in 6.24%, 6/60-6/18 in 4.16% and > 6/12 in 2.08%. After

treatment the BCVA recorded 6 months later was NLP in 18.72%, LP/HM in 64.48%, CF-5/60 in 6.24%, 6/60-6/18 in 8.32% and >6/12 in 2.08%.

The cases of globe rupture were 32 (66.67%), endophthalmitis 2 (4.17%), perforating injury 8 (16.64%) and retinal detachment 21 (43.75%).

After calculating raw sum 41.67% cases fell in category 1, 47.92% in category 2, 8.3% in category 3 and only 2.08% in category 4 while there was no case in category 5.

Description of BCVA according to different categories of OTS is given in table-1.

We calculated expected frequencies of final visual acuity in different categories of our study based on the results of OTS group. The observed frequencies were then compared with the expected frequencies and it showed that our study had NLP significantly less and LP/HM significantly more than expected ($p < 0.001$) in category 1. Category 2 had LP/HM more than expected ($p < 0.001$) (Table-2).

DISCUSSION

Our study was conducted on soldiers of Pakistan army fighting against terrorism on western borders. They were all young males with an average age of 27.73 years. There are no female soldiers fighting in the battle zone, therefore none could be included in our study. The majority of cases had visual acuity between NLP and HM (87.36%) on presentation with severe open globe injuries due to improvised explosive devices and mine blasts. Average travelling time between the battle zone and our hospital varies between 3-10 days. There are two military hospitals falling in chain of evacuation where primary ophthalmic care was provided. Therefore most of the cases reaching our institution fell in poor vision categories due to multiple injuries and required advance ophthalmic management. All the cases were treated according to their injuries, mostly requiring vitreoretinal intervention. After six months the visual acuities were recorded and compared with the expected visual outcomes based on OTS group. It was found that most of the results were comparable except that cases with final visual acuities of LP/HM were significantly more in categories 1 and 2 of our study than the OTS group.

A similar study was carried out on American soldiers fighting in Iraq[9]. Their average age was 25 years and 96% of them were males. The cases of COT were evacuated by air to Germany and then to Walter Reed Army Medical Center (WRAMC) in USA. In three and a half

Table-1: Description of OTS score and visual acuity (n = 48).

Visual Acuity	OTS Categories		
	0 – 44 (n = 20)	**45 – 65 (n = 23)**	**66 – 80 (n = 4)**
NLP	8 (40%)	1 (4.3%)	0 (0%)
LP / HM	12 (60%)	17 (73.9%)	2 (50%)
1/200 – 19/200	0 (0%)	2 (8.7%)	1 (25%)
20/200 – 20/50	0 (0%)	3 (13%)	1 (25%)
≥ 20/40	0 (0%)	0 (0%)	0 (0%)

Table-2: Comparison of observed and expected frequencies in different categories of OTS.

OTS category	Observed Frequency	Expected Frequency	*p*-value
Score 0 – 44 (n = 20)			
NLP	**8**	**14.6**	**< 0.001**
LP / HM	**12**	**3.4**	**< 0.001**
1/200 to 19/200	0	1.4	0.522
20/200 to 20/50	0	0.4	0.522
≥ 20/40	0	0.2	0.653
Score 45 – 65 (n = 23)			
NLP	**1**	**6.44**	**0.011**
LP / HM	**17**	**5.98**	**< 0.001**
1/200 to 19/200	2	4.14	0.245
20/200 to 20/50	3	2.99	0.995
≥ 20/40	**0**	**3.45**	**0.044**
Score 66 – 80 (n = 4)			
NLP	0	0.08	0.775
LP / HM	**2**	**0.44**	**0.013**
1/200 to 19/200	1	0.6	0.575
20/200 to 20/50	1	1.12	0.894
≥ 20/40	0	1.76	0.076

years 387 US soldiers (523 cases of globe injuries) of COT were evacuated. Six months follow-up could be completed in 54% of the cases. One hundred ninety eight cases had open globe injuries and 75% of these had BCVA of 6/60 or worse. In our study 93.60% of the cases had visual acuity worse than 6/60. The cases falling in category 1 were predicted to have final visual acuity of NLP in 92% while LP/HM in 7%. Category 2 was expected to have NLP 39% and HM/LP 20%. Category 3 NLP 0%, HM/LP 2% and > 6/12 54%. Category 4 should have had > 6/12 84%. There was no significant difference between the results of this study and OTS group. Compared with initial visual acuity, the visual acuity at the 6-month follow-up improved in 28%, remained unchanged in 69%, and decreased in 3%. The actual final visual acuities in this study were > 6/12 23%, 6/60-6/18 9%, CF-5/60 9%, HM/LP 30%, NLP 29% whereas the final visual acuities of our cases were > 6/12 2.08%, 6/60-6/18 8.32%, CF-5/60 6.24%, HM/LP 64.48% and NLP 18.72%. It is quite evident that the cases with final visual acuity of LP/HM in our study were significantly more. Very few of the patients had BCVA better than 6/12 in our study. It is because there was only one patient in category 4 and no patient in category 5.

When we compare the results of our study with OTS group and Weichel et al's work, we find that our visual outcomes were poor[9]. There are many factors contributing to this end. The nature of injuries in our cases was very severe because of multiple splinters and lack of eye protective shields. All American soldiers are provided with protective eye shields but despite aggressive eye protection recommendations, 179 (34%) of 523 eyes did not have protective eye armor at the time of injury[9]. The time between injury and first specialized ophthalmic care was greater in our soldiers because of rough terrain and limited air evacuation facility. Majority of our cases suffered multiple injuries and ophthalmic management had to wait for life and limb saving procedures. Moreover the interventional and rehabilitative facilities available in our part of the world are few and inferior.

Another study was conducted by Unver et al[10] on 114 eyes of open globe injuries. On comparing the distribution of final visual acuity in all OTS categories, no statistically significant difference was found (p=0.35) between the results of their study and the OTS group[10]. The cases in this study were non-combat with less severe injuries and few co-morbid conditions.

It is recommended that more studies be conducted in future including more cases with combat as well as non-combat ocular injuries to determine the role of Ocular Trauma Score in providing visual prognosis. Furthermore intraocular foreign bodies should also be given numerical value in calculating Ocular Trauma Score.

CONCLUSION

In combat ocular trauma, Birmingham Eye Trauma Terminology System provides an unambiguous common language for sharing eye injury information and Ocular Trauma Score can be accepted as a reliable tool for providing prognostic information.

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