

Assessment of Factors Affecting the Prognosis of Blunt Ocular Trauma: A Clinical StudySowmya Iyer¹, Bharti Badlani², Navindana³, Bharath Shiva⁴, Priyanka Singh^{5*}¹Fellow Cataract & IOL, Sadguru Netra Chikitsalaya, Chitrakoot, MP, India²Assistant Professor, Department of Ophthalmology, Chhindwara Institute of Medical Sciences, Chhindwara, MP, India³Assistant Professor, Department of Paediatrics, Mahaveer Institute of Medical Sciences, Bhopal, MP, India⁴MCH 1st Year Resident, Department of Breast & Endocrine Surgery, KGMU Lucknow, UP, India⁵Senior Resident, Department of Ophthalmology, Chhindwara Institute of Medical Sciences, Chhindwara, MP, India

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Abstract:

Background and Objectives: Ocular trauma is a preventable issue of public health that is prevalent worldwide. These injuries can be sustained in various settings, including sports, homes, assaults, agriculture, and industrial and road traffic accidents. Timely detection and immediate treatment lead to improved visual results, enhancing the overall well-being of the affected person. The earliest steps and treatments can significantly influence the final visual prognosis. The objective of this study is to evaluate the variables that influence the prognosis of blunt ocular damage.

Material and Methods: This study was conducted on 100 patients with blunt trauma attending the outpatient department and casualty of the upgraded Department of Ophthalmology at N.S.C.B. Medical College, Jabalpur (M.P.). The patients were from both rural and urban areas. The study took place from January 1, 2020, to August 31, 2021. This was achieved after gaining approval from the Scientific Review Committee and Institutional Ethics Committee, as well as securing written consent from the patients.

Results: In our study, the highest number of instances, accounting for 59 patients (59%), exhibited symptoms of reduced vision accompanied by discomfort. This was followed by 20 patients (20%) who had reduced vision, pain, watering, photophobia, and a sense of a foreign body. The fundus disease in certain individuals resulted in significant deterioration of vision, characterized by a near-complete loss of visual acuity and only being able to see light. This deterioration was caused by damage to the posterior segment of the eye, leading to the development of macular edema and traumatic optic neuropathy. The study revealed that 46% of patients' experienced significant visual improvement after receiving appropriate therapy, while 35% showed moderate improvement and 19% had limited improvement.

Conclusion: Upon careful evaluation of the frequency, causes, nature, consequences, and ultimate visual outcome, it is imperative to treat any closed globe damage as an urgent matter in ophthalmology. Even if the injury seems insignificant at first, it must be handled with appropriate care and caution to ensure the preservation of the eye's normal structure and function. Implementing improved road traffic regulations and providing comprehensive workplace eye safety education will effectively decrease the occurrence of ocular damage.

Keywords: Blindness; Blunt ocular trauma; RTA, Visual outcome.

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Introduction

Ocular trauma is a significant contributor to both ocular morbidity and blindness. The eyes' sensitive nature renders them susceptible to irreparable damage and lasting vision impairment, even from minor assault. [1] Ocular trauma leads to a diverse range of eye injuries that affect the globe, optic nerve, and adnexa. These injuries can range from

minor to severe, potentially causing vision problems. Over the past three decades, there has been significant progress in understanding the underlying mechanisms and treatment of many illnesses. Although there have been improvements in the methods used to treat these injuries, the outcome or prognosis is still unpredictable.

Blindness is consistently regarded as the most dreaded of all disabilities, and any potential harm to vision is profoundly distressing. [2] Ocular trauma is a preventable issue of public health that is prevalent globally. Approximately 55 million occurrences of ocular trauma occur worldwide each year, with 750,000 cases necessitating hospitalization. [3] These injuries can be sustained in various settings, including sports, homes, assaults, agriculture, and industrial and road traffic accidents. The reported prevalence of ocular trauma in India ranges from 1% to 5%. Timely detection and immediate treatment lead to improved visual results, enhancing the overall well-being of the affected person. The earliest steps and treatments can significantly influence the final visual prognosis.

Aim and Objectives: The objective of this study is to evaluate the variables that influence the prognosis of blunt ocular damage.

Material and Methods:

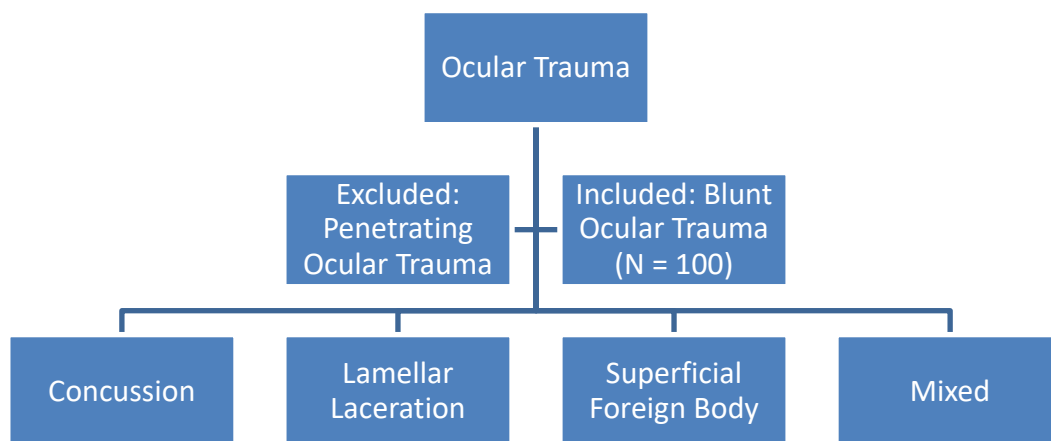


Figure 1: Consort diagram showing patient selection

Methodology:

In each case, a comprehensive medical history was obtained, focusing particularly on details such as the method and severity of the injury, presence of floaters or double vision, and symptoms experienced at the time of presentation, including pain, vision loss, blurred vision, redness, excessive tearing, eye swelling, and bleeding. Additionally, information regarding any concurrent systemic illnesses, medications, and family medical history was also gathered.

Each patient had visual acuity assessment with and without visual aids, as well as pinhole and refraction tests. Additionally, an examination of the anterior and posterior segments was performed for each patient. Wherever necessary, X-ray, CT scan, and/or B-scan were performed.

Statistical Analysis:

The data was inputted into Microsoft Excel and

This study was conducted in 100 patients with blunt trauma, who sought treatment at the outpatient department and casualty of the upgraded Department of Ophthalmology at N.S.C.B. Medical College, Jabalpur (M.P.) between January 1, 2020, and August 31, 2021.

The patients were from both rural and urban areas. This was achieved after gaining approval from the Scientific Review Committee and Institutional Ethics Committee, as well as securing written agreement from the patients.

Inclusion criteria: Blunt trauma patients of all age groups.

Exclusion criteria:

- Patients with history of ophthalmic complains previous to trauma
- Uncooperative patients with physical and mental abnormalities

analyzed using STATA version 14. Proportions were used to summarize categorical variables. The duration of follow-up was reported as the median value together with the interquartile range.

The association between categorical variables was assessed using either the chi-square test or the Fisher's exact test. Statistical significance was defined as a P value equal to or less than 0.05.

Results

Convenient sampling was used to choose a total of 100 patients. The current study reveals that ocular injuries are more prevalent among those in the younger age group and those who are in their prime working years.

Males are disproportionately impacted due to their higher involvement in road traffic accidents, as well as industrial and agricultural occupations. The research population's demographic profile is presented in Table 1.

Table 1: Demographic variables

Variables	N	%	
Age groups	≤20 years	10	10
	21-30 years	21	21
	31-40 years	32	32
	41-50 years	24	24
	>50 years	13	13
Gender	Male	85	85
	Female	15	15
Affected eye	Right eye	66	66
	Left eye	34	34
Locality	Urban	67	67
	Rural	33	33
Occupation	Student	18	18
	Farmer	17	17
	Laborer	39	39
	Housewife	13	13
	Businessmen	11	11
	Teacher	02	02
Mode of injury	Road traffic accidents	39	39
	Assault	20	20
	Foreign body	18	18
	Chemical injury	15	15
	Vegetative matter	03	03
	Play and sports	02	02
	Fall from height	02	02
	Bull horn	01	01
Pattern of injury	Concussion	61	61
	Lamellar laceration	22	22
	Superficial foreign body	17	17

Our study found that the highest number of cases, 43 patients (43%), had a visual acuity between 6/60-6/24. This was followed by 31 patients (31%) who had a visual acuity less than 6/60. [Table 2]

Table 2: Visual acuity at the time of presentation

Visual acuity	N	%
No PL	01	01
PL +	11	11
HM + - CM3FT	31	31
6/60 – 6/24	43	43
6/18 – 6/12	10	10
6/9 – 6/6	04	04
Total	100	100

During our investigation of fundus examination upon initial presentation, we observed weak media opacity in 29 patients, accounting for 29% of the total. Additionally, temporal pallor was observed in 18 patients, making up 18% of the total. Hyperemic optic discs were observed in 9 instances (9%), normal fundus was present in 14 cases (14%), absence of glow was noted in 12 cases (12%), Berlin's edema was detected in 16 patients (16%), and pale optic discs were observed in 2 patients (2%). [Table 3]

Table 3: Findings of fundus examination at the time of presentation

Fundus	N	%
1. Faint media opacity	29	29
2. Hyperaemic Optic disc	09	09
3. Pale Optic disc	02	02
4. Temporal pallor Optic disc	18	18
5. Berlin's edema	16	16
6. Within normal limits	14	14
7. No glow in media	12	12
8. Total	100	100

Out of the 12 patients included in our study who had a visual acuity of no PL-PL+, 7 individuals shown improvement. The patients with a visual acuity of 6/18-6/12 showed the greatest improvement in their vision, with 8 out of 10 patients seeing visual improvement. Nevertheless, the statistical analysis revealed that this data did not reach significance ($p>0.05$). [Table 4]

Table 4: Visual acuity improvement depending on presenting visual acuity in patients

Visual acuity	No. of patients presented		No. of patients showed improvement	
	Frequency (A)	Percentage (A/50)*100	Frequency (B)	Percentage (B/A)*100
No PL – PL +	12	12	07	07
HM + - CF3FT	31	31	22	22
6/60 – 6/24	43	43	24	24
6/18 – 6/12	10	10	08	08
6/9 – 6/6	04	04	02	02
Total	100	100	63	63

Chi square = 0.76; P=0.94.

Our study observed that out of the 7 patients who arrived within 6 hours after the trauma, 5 exhibited significant recovery, 1 showed moderate improvement, and 1 experienced poor visual improvement. Out of the 21 patients that arrived after 48 hours, only 6 patients shown significant

visual improvement, 3 patients exhibited moderate improvement, and 12 patients showed minimal improvement in their vision. Additionally, the data was determined to have statistical significance with a p-value of 0.013, which is less than the threshold of 0.05. [Table 5]

Table 5: Improvement of visual acuity as compared with time interval between trauma and initiation of treatment

Time interval	Good	Moderate	Poor
< 6 hours	05	01	01
6 – 12 hours	12	04	01
12 – 24 hours	20	06	04
24 – 48 hours	15	02	08
> 48 hours	06	03	12

Chi square = 19.224; P=0.013

Discussion

Ocular trauma is a significant contributor to both ocular morbidity and blindness. The eyes' sensitive nature renders them susceptible to irreparable damage and lasting vision impairment, even from minor assault. The current study observed the highest occurrence in individuals aged over 40 years, with a prevalence rate of 37%. This was followed by a prevalence rate of 32% in those aged between 31 and 40 years. A study conducted by Cho J et al [4] revealed that the greatest occurrence rate was 28.8% among individuals aged 11-20 years. Ulagantheran's study [5] found that the largest occurrence of the condition was observed in individuals aged 21-30 years, accounting for 43.2% of cases. Kearns P.'s study reported a prevalence of 41.4% in individuals aged 11-20 years. [6]

The current investigation revealed a greater prevalence of ocular damage in males compared to females. According to a research conducted by Canavan YM and Archer DB [7], out of 205 patients, 85.4% were men and 14.6% were females, resulting in a male to female ratio of 5.8:1. This is corroborated by research conducted by Kearns P [6], which likewise revealed a male to female ratio of 5.4:1. In contrast, a study conducted by Britten

MJA [8] indicated a significantly lower male to female ratio of 2.8:1. Due to the higher participation of males in outdoor activities, sports, employment in factories and industries, and driving, a male predominance is observed. The survey conducted by Khatry SK et al [9] revealed that the most prevalent vocations were farming (27.3%), household work (23.9%), student (13.2%), and workers (10.5%).

The predominant cause of injury in the current study was road traffic accidents, accounting for 39% of cases. Consistent results were found in investigations conducted by Guly et al [10], Shivanand B patil et al [11], Prachee Nagrale et al [12], and Maurya et al. [13] Non-metallic items were responsible for the majority (85%) of ocular trauma cases, and they often result in serious eye injuries. Other research, such as Krishnan et al. [14], Umesh et al. [15], and Mishra et al. [16], reported comparable results. During our examination of the fundus upon admission, we saw a mild light in 29 patients (29%) and temporal pallor of the optic disc in 18 patients (18%). Among the patients, 16% had Berlin's edoema, 9% had hyperemic optic discs, and 2% had pale optic discs. The fundus pathology in certain individuals resulted in significant deterioration of vision, with a

decrease in visual acuity to the point that they could only perceive hand motions and light. This deterioration was caused by trauma to the posterior segment, which led to the development of macular edema and traumatic optic neuropathy.

According to a research conducted by Canavan YM and Archer DB [7], 75.1% of the participants were able to acquire a visual acuity greater than 6/12 after receiving therapy. A research conducted by Kearns P [6] found that 88.98% of participants acquired a visual acuity greater than 6/18 following therapy. The therapy resulted in a statistically significant improvement in BCVA. The visual result in 19 individuals was adversely affected by various complications including vitreous loss leading to secondary glaucoma, macular scarring, choroidal rupture, Berlin's edema, retinal detachment, and traumatic optic neuropathy. Therefore, it is clear that the main cause of poor visual clarity in most patients was related to the involvement of the posterior region.

A statistically significant correlation (P value 0.013) was seen between the time elapsed between the trauma and the time of arrival at the hospital, and the best corrected visual acuity (BCVA) at the end of 1 month. The study conducted by Cho J et al [4] found no statistically significant association between the time gap from damage to initial evaluation and a bad end visual prognosis. Upon careful evaluation of the frequency, causes, nature, consequences, and ultimate visual outcome, it is imperative to treat any closed globe injury as an urgent matter in ophthalmology. Regardless of its initial appearance as a minor injury, it must be handled with utmost care, caution, and efficiency in order to preserve the eye's structure and function to the greatest extent possible.

Conclusion

Closed globe injuries cause substantial damage to the structures within the eye. The majority of injuries occur in situations that may be anticipated and so have the potential to be avoided. Upon careful evaluation of the frequency, causes, nature, consequences, and ultimate visual outcome, it is imperative to classify any closed globe damage, regardless of its first appearance, as an urgent matter in ophthalmology. It must be promptly addressed with appropriate care and caution to preserve the normal structure and function of the eye. Enhancing road traffic regulations and educating the public about eye safety in workplaces can effectively decrease the occurrence of ocular damage.

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