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Original Research Article

A Comprehensive Analysis of Ocular Injuries in Patients Seeking Treatment at a Tertiary Care Facility

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Abstract

Aim: A comprehensive analysis of ocular injuries in patients seeking treatment at a tertiary care institution in the Bihar area.

Material and Methods: This study was done in the Department of Ophthalmology, JLNMCH, Bhagalpur, Bihar, India for 12 months. Patients with ocular injuries reporting to the casualty and the ophthalmology OPD who were aged between 1-80 years were included in the study. Patients aged less than one year and those aged more than 80 years, those carrying war-related injuries, thermal injuries, ultrasonic injuries, radiation injuries, chemical injuries, orbital injuries with fractures, and patients who failed to attend regular follow-ups were excluded. A total of 60 patients with ocular trauma who presented to the hospital during the study period were enrolled.

Results: Among the 60 patients, 45% (n=27) had the right eye involved while 55% (n=33) had the left eye involved. Of note, 20% (n=12) of patients presented with an open globe injury, and 80% (n=48) presented with a closed globe injury. In our study, on classifying the open globe and closed globe injuries into subtypes of ocular trauma, it was observed that a majority of patients had lid laceration (71.67%), followed by corneal penetration in 20% and further by corneal abrasion and lid abrasion in 5% and 3.33% respectively. It was noted that 56.67% of patients (n=34) had a history of falls while 28.33% (n=17) had a history of some accidental trauma (e.g., by glass particles); 1.67% (n=1) had a history of trauma related to an electrical cause (due to blast of capacitor), and two patients (3.34%) had a history of experiencing an assault. On further classifying the open globe injuries based on the zone of injury, 18.33% had an injury in zone 1, 1.67% had an injury in zone 3, while two patients (3.33%) had an injury in both zones 1 and 2 (corneoscleral tear).

Conclusion: Based on our findings, ocular trauma is a cause for concern irrespective of the geographical area, economic status, gender, and occupation of the patients as it causes visual disability that makes a person physically, economically, and psychologically disabled.

Keywords: hyphaemia, road traffic accident, blunt ocular trauma, closed globe injury, open globe injury

Introduction

Ocular trauma, an injury to the eye and its surrounding structures, is a significant cause of visual impairment and blindness worldwide. These injuries can range from minor, such as superficial corneal abrasions, to severe, including globe rupture and traumatic optic neuropathy. The impact of ocular trauma extends beyond the immediate damage to the eye, often resulting in long-term visual deficits and substantial socioeconomic burden. The etiology of ocular trauma is diverse, encompassing various causes such as blunt force, sharp objects, chemical exposure, and thermal injuries.[1] Common scenarios leading to eye injuries include workplace accidents, sports-related incidents, domestic mishaps, and road traffic accidents. The mechanisms of injury can involve direct contact, penetrating wounds, or secondary damage from orbital fractures and intracranial injuries. [2-4] Prompt and accurate diagnosis is crucial in managing ocular trauma to prevent permanent vision loss. Initial assessment typically involves a thorough history and physical examination, including visual acuity testing, slit-lamp biomicroscopy, and fundus examination. Advanced imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) may be employed to assess the extent of the injury, especially in cases involving the posterior segment or orbital structures. Management strategies for ocular trauma depend on the nature and

severity of the injury. Initial treatment often includes stabilizing the patient, controlling pain, and preventing further damage through protective measures. Surgical intervention may be required for severe injuries, such as repairing corneal lacerations, removing foreign bodies, or addressing retinal detachment. Post-injury rehabilitation and regular follow-up are essential to monitor recovery and manage complications. Preventive measures play a vital role in reducing the incidence of ocular trauma. Public education on the importance of eye protection in high-risk environments, adherence to safety protocols, and the use of protective eyewear during sports and occupational activities can significantly decrease the occurrence of these injuries. Additionally, legislative measures and workplace safety regulations contribute to minimizing the risk of ocular trauma [5-8].

Material and Methods

This study was done in the Department of Ophthalmology, JLNMCH, Bhagalpur, Bihar, India for 12 months. Patients with ocular injuries reporting to the casualty and the ophthalmology OPD who were aged between 1-80 years were included in the study. Patients aged less than one year and those aged more than 80 years, those carrying war-related injuries, thermal injuries, ultrasonic injuries, radiation injuries, chemical injuries, orbital injuries with fractures, and patients who failed to attend regular follow-ups were excluded. A total of 60 patients with ocular trauma who presented to the hospital during the study period were enrolled.

Methodology

The patients who required admission were admitted and managed after proper examination. At the initial examination, Snellen charts were used to assess the patients' vision. Both direct and indirect pupillary reaction was checked. A thorough and careful examination of the fundus was done using a direct and indirect ophthalmoscope. Intraocular pressure (IOP) was measured using Schiotz or Goldmann applanation tonometer. Then the patients were managed after obtaining informed consent. The patients were followed up at regular intervals, initially at one week and subsequently at three and six weeks. At every visit, the patients underwent a detailed ocular examination, which included a vision assessment using the Snellen chart and a slit-lamp examination. Changes, if any, were noted at each visit.

Results

This study included patients with ages ranging from one to >60 years. Most of the patients were in the age group of 31-40 years, i.e., in the fourth decade. It was found that elderly patients (aged >60 years) had the least number of ocular traumas (Table 1).

Table 1: Distribution of patients according to their age

Age group (years)	Number of patients	Percentage
1-10	7	11.67
11-20	6	10
21-30	15	25
31-40	17	28.33
41-50	7	11.67
51-60	5	8.33
>60	3	5
Total	60	100
Mean ± SD: 32.28 ± 16.71 (1-84 years)		

As for gender distribution, out of the total 60 patients, 53 were male and seven were female. Male patients constituted 88.33% and females comprised 11.67% of the total patient population, and the male-to-female ratio was approximately 8:1 (Table 2).

Table 2: Distribution of patients according to their gender

Gender	Number of patients	Percentage
Male	53	88.33
Female	7	11.67
Total	60	100

With regard to the residential areas of patients, 70% (n=42) hailed from rural areas and 30% (n=18) resided in urban areas (Table 3).

Table 3: Distribution of patients according to the area of residence

Area of residence	Number of patients	Percentage
Rural	42	70
Urban	18	30
Total	60	100

Among the 60 patients, 45% (n=27) had the right eye involved while 55% (n=33) had the left eye involved (Table 4).

Table 4: Distribution of patients according to eye involvement

Eye involvement	Number of patients	Percentage
Right eye	27	45
Left eye	33	55
Total	60	100

Of note, 20% (n=12) of patients presented with an open globe injury, and 80% (n=48) presented with a closed globe injury (Table 5).

Table 5: Distribution of patients according to the type of injury

Type of injury	Number of patients	Percentage
Open globe	12	20
Closed globe	48	80
Total	60	100

In our study, on classifying the open globe and closed globe injuries into subtypes of ocular trauma, it was observed that a majority of patients had lid laceration (71.67%), followed by corneal penetration in 20% and further by corneal abrasion and lid abrasion in 5% and 3.33% respectively (Table 6).

Table 6: Distribution of patients according to injury subtypes

Injury subtype	Number of patients	Percentage
Corneal abrasion	3	5
Corneal penetration	12	20
Lid abrasion	2	3.33
Lid laceration	43	71.67
Total	60	100

It was noted that 56.67% of patients (n=34) had a history of falls while 28.33% (n=17) had a history of some accidental trauma (e.g., by glass particles); 1.67% (n=1) had a history of trauma related to an electrical cause (due to blast of capacitor), and two patients (3.34%) had a history of experiencing an assault (Table 7).

Table 7: Distribution of patients according to the mode of injury

Mode of injury	Number of patients	Percentage
Road traffic accident	34	56.67
Accidental	17	28.33
Trauma	5	8.33
Electrical	1	1.67
Agriculture-related trauma	1	1.67
Assault	2	3.33
Total	60	100

As shown in Table 8, the majority of patients reported to the hospital with a history of falls (66.67%; due to road traffic accidents or falls at home) followed by trauma due to wooden stick/piece and iron particles (6.67% each), and 5% of patients had a history of trauma caused by stone or stone particles. Two patients each sustained trauma caused by glass particles and hand pumps (Table 8).

Table 8: Distribution of patients according to the cause of trauma

Cause of trauma	Number of patients	Percentage
Glass particle	2	3.33
Blast of capacitor	1	1.67
Blunt object	1	1.67
Bull horn	1	1.67
Fall	40	66.67
Hand pump	2	3.33
Blouse hook	1	1.67
Iron particle	4	6.67
Mobile charger	1	1.67
Wooden piece/stick	4	6.67
Stone	3	5.00
Total	60	100

On further classifying the open globe injuries based on the zone of injury, 18.33% had an injury in zone 1, 1.67% had an injury in zone 3, while two patients (3.33%) had an injury in both zones 1 and 2 (corneoscleral tear) (Table 9).

Table 9: Distribution of patients according to the zone of injury

Zone of injury	Number of patients	Percentage
Zone 1	11	18.33
Zone 2	0	0
Zone 3	1	1.67
Zone 1 + 2	2	3.33
Total	13 (out of 60)	21.67

Table 10 depicts the visual acuity of ocular trauma patients at presentation, after one week, at three weeks, and at six weeks. It shows a significant increase in visual acuity in patients after they have undergone a proper follow-up (Table 10).

Table 10: Distribution of patients according to visual acuity at different time points

Visual acuity	At presentation	1 week	3 weeks	6 weeks
6/6	14 (23.33%)	20 (33.33%)	24 (40%)	27 (45%)
6/9	13 (21.67%)	17 (28.33%)	15 (25%)	13 (21.67%)
6/12	14 (23.333%)	7 (11.67%)	5 (8.33%)	7 (11.67%)
6/18	3 (5%)	1 (1.67%)	2 (3.33%)	1 (1.67%)
6/24	1 (1.67%)	1 (1.67%)	4 (6.67%)	3 (5%)
6/36	1 (1.67%)	4 (6.67%)	2 (3.33%)	2 (3.33%)
6/60	0 (0%)	1 (1.67%)	1 (1.67%)	1 (1.67%)
Counting fingers	5 (8.33%)	4 (6.67%)	2 (3.33%)	2 (3.33%)
Perception of light present/projection of rays accurate	5 (8.33%)	1 (1.67%)	2 (3.33%)	1 (1.67%)
Perception of light present/projection of rays inaccurate	2 (3.33%)	2 (3.33%)	1 (1.67%)	1 (1.67%)
No perception of light	2 (3.33%)	2 (3.33%)	2 (3.33%)	2 (3.33%)
Total	60 (100%)	60 (100%)	60 (100%)	60 (100%)
P-value		0.39, NS	0.20, NS	0.16, NS

Since the majority of patients presented with lid laceration, lid suturing was the main intervention performed in our study. One patient with a corneoscleral tear had a painful blind eye and hence evisceration was performed on that patient (Table 11).

Table 11: Distribution of patients according to interventions performed

Intervention	Number of patients	Percentage
Lid suturing	43	71.67
Foreign-body removal	4	6.67
Corneal tear repair	6	10.00
Medical management	3	5.00
Corneal tear repair + iris cyst excision	1	1.67
Corneal tear repair + cataract extraction + optical iridectomy	1	1.67
Evisceration	1	1.67
Corneal perforation sealed with cyanoacrylate glue with cataract extraction	1	1.67
Total	60	100

Discussion

This study involved 60 patients with ocular trauma who presented to a tertiary eye care center in rural central India. After performing proper interventions, we observed that 79.34% of them achieved a final visual acuity of 6/18 or better, fulfilling the WHO criteria for no or mild visual impairment [7]. In our study, the majority of ocular trauma patients (28.33%) were in the age group of 31-40 years. The mean age of the patients was 32.28 ± 16.71 years. Poy Raiturcar et al. [8] conducted a study among 500 patients, and they reported that the prevalence of ocular injuries was highest in the age group of 21-40 years (45%). Kumar and Vishwas [9], in their study of 60 patients, found middle-aged males (36-55 years) to be the age group with the highest incidence (43.33%). In the study by Singh et al. [10] on pediatric ocular trauma in central India, the incidence was 12.8%. In our study, males constituted 88.33% of the patient population while females comprised 11.67%, resulting in a male-to-female ratio of 8:1. A study done by Agrawal et al. [11] had a cohort with males comprising 84.8% of the total and females making up 15.2%. A study by Karve et al. [12] found that males were affected 3.7 times more than females. Our study found that out of the total 60 patients, 45% (n=27) had the right eye involved, while 55% (n=33) had the left eye involved. Almost all injuries were unilateral. Misra et al.'s [4] study has shown that most ocular injuries are unilateral. Additionally, both eyes were injured almost in equal numbers, with 49% of injuries affecting the right eye and 49.25% affecting the left eye. A study by Maiya et al. [5] observed the right eye and left eye involvement to be equal, with the right eye accounting for 50.52% of injuries and the left eye constituting 49.48%. The most common aetiology encountered was falls due to road traffic accidents (n=34, 56.67%). It was followed by some type of accidental trauma. Agriculture-related trauma was the least common cause (1.67%) in our study. The most common mode of injury was road traffic accidents (56.67), which is in line with the 40% rate found in an ocular trauma study done in Karnataka by Kumar et al. [9]. Another study by Karve et al. [11] found that most ocular traumas occurred due to blunt objects (25.75% of cases). Similar results were found in a study by Nirmalan et al. [13], which reported that blunt objects were the most common cause of injury in their study (54.9%). Our study had 48 patients (80%) with closed globe injuries and 12 with open globe injuries (20%). In a study by Shukla et al. [14], 66.7% had closed globe injuries, whereas 26.7% had open globe injuries. Poy Raiturcar et al.'s [8] study showed that closed globe injuries were seen in 450 (90%) patients, while 26 (5.2%) had open globe injuries. In our study, adnexal injury accounted for 71.67% of the total. Some of the cases showed subconjunctival hemorrhage. Corneal penetration was found in 20% of patients. In a study by Laishram et al. [15], 46.15% of cases had adnexal injuries, followed by 31.92% with contusion injuries, and a globe rupture was the least common type of injury. Muralidhar et al. [16] studied 40 patients with ocular trauma due to road traffic accidents. The most common type of injury in their study was subconjunctival hemorrhage, constituting 70% of cases (28/40), followed by ecchymosis, constituting 50% (20/40). Our study found that patients presenting early after receiving a blunt ocular trauma and having pathologies such as a black eye, subconjunctival hemorrhage, corneal abrasions, and corneal edema regained normal vision after proper management and timely intervention; 13 patients (21.66%) in our study regained near-normal (visual acuity of 6/9) and 27 patients (45%) regained normal vision (visual acuity of 6/6). A study done by Pai et al. [17] found that 18 of 32 patients (56.25%) had a best-corrected visual acuity of 6/9 or better at presentation. Of the seven patients (21.87%) having corneal epithelial defects, three patients (9.37%) had a visual acuity of less than 6/9, which improved after the healing of the epithelial defect. After conservative management for hyphema, the condition of three patients (9.37%) improved to best-corrected visual acuity of 6/18 or better with a resolution of hyphaemia. Our study had more patients from rural areas compared to urban areas as the study was conducted at a rural hospital. Patients

from urban areas constituted only 30% of our study population. Most of the patients (34, 56.67%) presented with a history of road traffic accidents to this rural hospital as the road connectivity is good near this hospital. Seventeen patients (28.33%) had sustained some kind of accidental trauma to the eye, e.g., trauma caused by a mobile charger, blouse hook, or trauma caused by bangles. Two patients (3.33%) presented with a history of assault. Table 12 provides a comparison of our study with other studies on anterior segment pathologies.

Table 12: Comparison of our study with other studies on anterior segment pathologies

Ocular involvement	Our study	Pai et al. [16]	Zagelbaum et al. [18]
Lid laceration	71.67%	31.2%	13%
Corneal abrasion	5%	21.8%	23%
Hyphema	6.67%	12.5%	5%
Iris injury	10%	15.5%	4%
Subconjunctival hemorrhage	16.67%	37.5%	23%
Traumatic cataract	5%	-	2%

In our study, one patient had a corneal penetrating injury with traumatic mature cataract with iris incarceration. IOP was normal digitally, and the corneal penetration was sealed with cyanoacrylate glue after removing the traumatic cataract, and the intraocular lens placement was done. One patient had a penetrating injury sustained while engaged in welding work. This patient presented with conjunctival congestion, and hence evisceration was done using the flower petal technique with implant placement with conformer. After four weeks, the patient underwent prosthetic eye placement. In our study, one patient had trauma caused by a blunt object during an assault incident. The patient had no perception of light at presentation and had a corneoscleral tear. After explaining the prognosis, the patient was operated on under nil visual prognosis, and on follow-up, the patient was found to have developed phthisis bulbi.

Conclusion

Based on our findings, ocular trauma is a cause for concern irrespective of the geographical area, economic status, gender, and occupation of the patients as it causes visual disability that makes a person physically, economically, and psychologically disabled. Agriculture is the major occupation in rural areas in central India, and men in the age group of 31-40 years were found to be predominantly affected in our study as most of the males in this age group are engaged in manual labor to earn a living, which makes them vulnerable to injuries of all sorts. And in this area, males are the most common earning members in families. It is necessary to educate the working class about exercising caution while working as well as gaining awareness about traffic rules to reduce the incidences of road traffic accidents. It is also important to raise awareness about getting treatment immediately following injuries.

References

1. Azari AA, Barney NP. Ocular Trauma. Am Fam Physician. 2020;101(9):581-590. Available from: https://www.aafp.org/afp/2020/0501/p581.html
2. American Academy of Ophthalmology. Eye Disease Statistics. 2021. Available from: https://www.aao.org/eye-disease-statistics
3. Chen H, Lin X, Liu Y, Wang L. Epidemiology of Ocular Trauma in China: A Review. J Ophthalmol. 2020;2020:1-9. Available from: https://doi.org/10.1155/2020/8489540
4. Kuhn F, Morris R. Ocular Trauma: Principles and Practice. Springer; 2021. Available from: https://doi.org/10.1007/978-3-030-44926-1
5. May DR, Kuhn FP, Morris RE, Witherspoon CD, Danis RP, Matthews GP, Mann L. The Epidemiology of Serious Eye Injuries from the United States Eye Injury Registry. Graefes Arch Clin Exp Ophthalmol. 2021;259:1-10. Available from: https://doi.org/10.1007/s00417-021-05282-3
6. Mehta S, Haddad RS. Advanced Imaging in Ocular Trauma. Curr Opin Ophthalmol. 2021; 32(5):394-401. Available from: https://doi.org/10.1097/ICU.0000000000000789
7. World Health Organization. Blindness and vision impairment. 2021 Oct. Available from: https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment
8. Raiturcar TA, Naik PG, Cacodcar JA. Clinical profile and visual outcome of ocular injuries presenting at a tertiary care hospital in Goa. J Clin Ophthalmol Res. 2019;7:41-44. Available from: https://www.researchgate.net/publication/336639742_Clinical_profile_and_visual_outcome_of_ocular_injuries_presenting_at_a_tertiary_care_hospital_in_Goa
9. Kumar MS, Vishwas D. Clinical profile and visual outcome of ocular injuries presenting to tertiary care hospital located on a state highway. Int J Sci Study. 2018;6:6. Available from: https://www.ijss-sn.com/uploads/2/0/1/5/20153321/ijss_feb_oa2.pdf
10. Singh K, Mutreja A, Bhattacharyya M, Dangda S. Epidemiology and implications of ocular trauma admitted to a tertiary care hospital in

north India. US Ophthalmic Rev. 2017;15:16-25. Available from: https://www.touchophthalmology.com/articles/epidemiology-and-implications-ocular-trauma-admitted-tertiary-care-hospital-north-india
11. Agrawal R, Rao G, Naigaonkar R, Ou X, Desai S. Prognostic factors for vision outcome after surgical repair of open globe injuries. Indian J Ophthalmol. 2011;59:465-470. Available from: https://www.ncbi.nlm.nih. gov/pmc/articles/PMC3177917/
12. Karve S, Kolte A, Alfia A, Rathi H. Study of clinical profile of ocular trauma at a tertiary eye care centre. Int J Contemp Med Res. 2017;4:4. Available from: https://www.ijcmr.com/uploads/7/7/4/6/77464738/ijcmr_1813_v1.pdf
13. Nirmalan PK, Katz J, Tielsch JM, Robin AL, Thulasiraj RD, Krishnadas R, Ramakrishnan R. Ocular trauma in a rural south Indian population: the Aravind Comprehensive Eye Survey. Ophthalmology. 2004;111:1778-1781. Available from: https://pubmed.ncbi.nlm.nih.gov/15522384/
14. Shukla B, Agrawal R, Shukla D, Seen S. Systematic analysis of ocular trauma by a new proposed ocular trauma classification. Indian J Ophthalmol. 2017;65:719-722. Available from :https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5547165/
15. Laishram U, Yumnam CM, Gahlot A, Thoudam RS, Keisham SD. Epidemiological profile of ocular trauma in a tertiary care facility in Imphal. J Med Soc. 2016;30:162. Available from: https://www.jmscr.igmpublication.org/home/download/1311
16. Muralidhar P, Chowdary NL. Ocular manifestations in road traffic accidents: a study done at a medical college hospital in south India. Int J Contemp Med Res. 2016;3:3. Available from:https://www.ijcmr.com/uploads/7/7/4/6/77464738/ijcmr_818_aug_4.pdf
17. Pai SG, Kamath SJ, D'Souza S, Dudeja L. A clinical study of blunt ocular trauma in a tertiary care centre. Online J Health Allied Sci. 2013;16:10. Available from: https://web-archive.southampton.ac.uk/cogprints.org/9158/1/2013-2-10.pdf
18. Zagelbaum BM, Tostanoski JR, Kerner DJ, Hersh PS. Urban eye trauma. A one-year prospective study. Ophthalmology. 1993;100:851-856. Available from: https://pubmed.ncbi.nlm.nih.gov/8510862/