

## Pattern and Visual Outcome of Ocular Trauma Presenting to the Emergency Department of Swat Medical Complex Teaching Hospital

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### ABSTRACT

**Background:** Ocular trauma is a major cause of visual impairment and preventable blindness worldwide, particularly in developing countries. Understanding the pattern and outcomes of eye injuries is essential for improving management and prevention strategies.

**Objective:** To evaluate the pattern of ocular trauma and assess the visual outcomes among patients presenting to the emergency department.

**Methods:** This was a hospital-based descriptive cross-sectional study conducted at Swat Medical Complex Teaching Hospital from January 2021 to January 2022 including 85 patients presenting with ocular trauma to the emergency department. Patients with any form of eye injury presenting to the emergency unit were enrolled

**Results:** The mean age of patients was  $27.6 \pm 14.2$  years, with males accounting for 71.8% of cases. Domestic accidents (28.2%) and occupational injuries (24.7%) were the most common causes of trauma. Closed globe injuries were more frequent (61.2%) than open globe injuries (38.8%). The mean time to presentation was  $13.4 \pm 7.6$  hours. Severe visual impairment at presentation was observed in 47.1% of patients. Following management, visual improvement occurred in 45.9% of cases.

**Conclusion:** Ocular trauma predominantly affects young males and is commonly associated with domestic and occupational injuries. Early diagnosis, prompt treatment, and preventive measures are crucial for improving visual outcomes and reducing the burden of ocular trauma.

**Keywords:** Ocular trauma; Visual outcome; Eye injuries; Closed globe injury; Open globe injury; Emergency ophthalmology.

### INTRODUCTION

Globally, ocular trauma is one of the most important causes of visual impairment and avoidable blindness, which adds immensely to the burden of eye disease in the world<sup>1</sup>. Eye injuries may take place both at home, at occupational places or even at roads and at recreational places and may be mild superficial injuries or severe globe damages that could lead to irreversible damage to vision<sup>2</sup>. The eye is a very sensitive and highly specialized organ and therefore any form of minor trauma can cause severe impairment of its functionality unless timely diagnosed and handled<sup>3</sup>. Ocular trauma is especially common in the developing countries because exposures on the job, low levels of safety consciousness and absence of protective gears contribute to the risk of eye trauma<sup>4</sup>. Ocular trauma is a significant socioeconomic issue of public health, as young adults and working-age people are among the affected population<sup>5</sup>. The prognosis is further aggravated and the risk of having permanent visual disability is increased by late presentation to the healthcare facilities in most instances<sup>6</sup>. Ocular injuries are normally categorized into open eye globe injuries and closed eye globe injuries based on the status of the eyeball<sup>7</sup>. Closure globe injuries entail contusions and lamellar lacerations whereas the open globe injuries are corneal or scleral full-thickness wounds and are linked to a worse prognosis<sup>8</sup>. Intraocular foreign bodies, chemical injuries, and orbital trauma are other types of ocular trauma, and each has varying degrees of visual risks<sup>9</sup>. Patients with ocular trauma are often seen in the emergency departments. Critical issues are the rapid evaluation, correct categorization of the trauma, and timely treatment to prevent the development of chronic complications and optimize visual performance<sup>10</sup>. The development of ophthalmics and microsurgical procedures has enhanced the treatment of eye trauma, but serious cases are still very difficult in restoring optimum visual recovery<sup>11</sup>. Through a number of studies, it has been determined that type and severity of injury, interval between injury and treatment and availability of specialized ophthalmic care have impactful effects on the final visual outcomes<sup>12</sup>. Earlier management and prompt surgical treatment can significantly enhance the probability of visual recovery in most of the cases<sup>13</sup>. Such preventive measures like protective eyewear and safety regulations at work are also that worthy of improving the rates of ocular trauma reduction<sup>14</sup>. Knowledge of the trend, etiology and consequences of eye trauma is vital in the development of prevention strategies as well as enhancing care<sup>15</sup>. Hospital-based

epidemiological data could be effective in terms of identification of the type of injuries, risk factors, and visual outcomes related to ocular trauma<sup>16</sup>.

**Objective:** To evaluate the pattern of ocular trauma and assess the visual outcomes among patients presenting to the emergency department.

### METHODOLOGY

This descriptive cross-sectional study conducted at Swat Medical Complex Teaching Hospital from January 2021 to January 2022 including 85 patients presenting with ocular trauma to the emergency department.

#### Inclusion Criteria

- Patients of all ages presenting with recent ocular trauma.
- Patients diagnosed with ocular injury based on clinical ophthalmic examination.
- Patients willing to participate and with complete clinical evaluation.

#### Exclusion Criteria

- Patients with pre-existing ocular diseases affecting visual acuity.
- Patients with previous history of ocular surgery unrelated to trauma.
- Patients with incomplete clinical data or lost to follow-up.

**Data Collection:** After obtaining informed consent, demographic and clinical information was collected using a structured proforma. Variables recorded included age, gender, cause of injury, place of injury, type of ocular trauma, and time interval between injury and hospital presentation. Detailed ophthalmic examination was performed including visual acuity assessment, slit-lamp examination, and fundoscopic evaluation when possible. Injuries were classified according to standard ocular trauma classification into open globe and closed globe injuries. Additional investigations such as ocular ultrasonography or imaging were performed when required. Treatment details and final visual outcomes were recorded during follow-up visits.

**Statistical Analysis:** Data were entered into Microsoft Excel and analyzed using SPSS version 26. Continuous variables were expressed as mean  $\pm$  standard deviation, while categorical variables were presented as frequencies and percentages. Associations between injury patterns and visual outcomes were analyzed using

chi-square test where appropriate. A p-value <0.05 was considered statistically significant.

**RESULT**

A total of 85 patients with ocular trauma were included with a mean age of 27.6 ± 14.2 years. The most affected age group was 16–30 years comprising 36 patients (42.4%), followed by 31–45 years with 21 patients (24.7%), while children ≤15 years and adults >45 years each accounted for 14 patients (16.5%). Males were predominantly affected (61, 71.8%) compared with females (24, 28.2%). A greater proportion of patients were from rural areas (53, 62.4%) than urban areas (32, 37.6%), indicating higher exposure to injury risk in rural populations.

Regarding the causes of injury, domestic accidents were the most frequent cause accounting for 24 cases (28.2%), followed by occupational injuries in 21 patients (24.7%) and road traffic accidents in 17 patients (20.0%). Assault-related injuries were reported in 14 cases (16.5%), while sports injuries accounted for 9 cases (10.6%). Most injuries occurred at home (29, 34.1%), followed by workplaces (23, 27.1%) and road-related settings (17, 20.0%). Fewer injuries occurred at sports fields (9, 10.6%) and other locations (7, 8.2%).

Closed globe injuries were more common, observed in 52 patients (61.2%), while open globe injuries were present in 33 patients (38.8%). Among closed globe injuries, contusion was the most frequent type occurring in 28 cases (32.9%), followed by lamellar lacerations in 24 cases (28.2%). Among open globe injuries, penetrating injuries were the most common (21, 24.7%), followed by perforating injuries (7, 8.2%) and intraocular foreign bodies (5, 5.9%).

The mean time to hospital presentation after injury was 13.4 ± 7.6 hours. Nearly half of the patients presented within 7–24 hours (41, 48.2%), while 24 patients (28.2%) presented within the first 6 hours. Delayed presentation beyond 24 hours occurred in 20 patients (23.5%). In terms of management, surgical intervention was required in 48 patients (56.5%), whereas 37 patients (43.5%) were treated with medical management alone.

Initial visual assessment showed that 40 patients (47.1%) had severe visual impairment (<6/60), while moderate impairment (6/18–6/60) was observed in 27 patients (31.8%) and normal vision (≥6/12) in 18 patients (21.2%). Following management, visual improvement was achieved in 39 patients (45.9%), while 28 patients (32.9%) showed no significant change.

Table 1. Demographic Characteristics of Patients with Ocular Trauma (N = 85)

Variable	Category	n (%) / Mean ± SD
Age (years)	Mean age	27.6 ± 14.2
Age Group	≤15 years	14 (16.5%)
	16–30 years	36 (42.4%)
	31–45 years	21 (24.7%)
	>45 years	14 (16.5%)
Gender	Male	61 (71.8%)
	Female	24 (28.2%)
Residence	Urban	32 (37.6%)
	Rural	53 (62.4%)

Table 2. Causes and Circumstances of Ocular Trauma

Variable	Category	n (%)
Cause of Injury	Road traffic accident	17 (20.0%)
	Occupational injury	21 (24.7%)
	Sports injury	9 (10.6%)
	Assault	14 (16.5%)
	Domestic accident	24 (28.2%)
Place of Injury	Home	29 (34.1%)
	Workplace	23 (27.1%)
	Road	17 (20.0%)
	Sports field	9 (10.6%)
	Other locations	7 (8.2%)

Table 3. Types and Classification of Ocular Trauma

Variable	Category	n (%)
Type of Injury	Closed globe injury	52 (61.2%)
	Open globe injury	33 (38.8%)
Closed Globe Injury	Contusion	28 (32.9%)
	Lamellar laceration	24 (28.2%)
Open Globe Injury	Penetrating injury	21 (24.7%)
	Perforating injury	7 (8.2%)
	Intraocular foreign body	5 (5.9%)

Table 4. Time of Presentation and Management of Ocular Trauma

Variable	Category	n (%) / Mean ± SD
Time to Presentation (hours)	Mean time	13.4 ± 7.6
	Presentation Time	
Presentation Time	≤6 hours	24 (28.2%)
	7–24 hours	41 (48.2%)
	>24 hours	20 (23.5%)
Treatment Type	Medical management	37 (43.5%)
	Surgical intervention	48 (56.5%)

Table 5. Visual Outcome After Management of Ocular Trauma

Variable	Category	n (%)
Initial Visual Acuity	Normal vision (≥6/12)	18 (21.2%)
	Moderate impairment (6/18–6/60)	27 (31.8%)
	Severe impairment (<6/60)	40 (47.1%)
Final Visual Outcome	Improved vision	39 (45.9%)
	No significant change	28 (32.9%)
	Worsened vision	18 (21.2%)

**DISCUSSION**

This paper assessed the trend and visual experience of ocular trauma on the patients presenting to an emergency department. The average age of the patients stood at 27.6 and standard deviation is 14.2 years with the age group of 16-30 years recording the highest percentage of 42.4. It mostly affected male patients (71.8) more than females (28.2). This is in line with a previous study where it was reported that ocular trauma in previous research was more prevalent in young males because of the increased outdoor activity, occupational exposure, and risk-prone behavior<sup>17</sup>. Injury causes were analyzed and it was found that the most frequent causes of ocular trauma were domestic accidents (28.2) and occupational injuries (24.7), followed by road traffic accidents (20.0) and assault related injuries (16.5). Most of them were at home (34.1%) and workplaces (27.1%). Past studies have documented similar results that domestic and workplace conditions were the prime places where ocular injuries occur especially in areas where safety precautions and sensitizations on occupational safety are minimal<sup>18</sup>. Closed globe injuries were more common (61.2) as compared to open globe injuries (38.8). Out of the closed globe injuries, the contusion was 32.9% and lamella laceration, 28.2%. The most common type of open globe injury was the penetrating one (24.7). The same pattern of injury was reported in earlier studies where closed globe injuries were most frequently identified as the cause of ocular trauma although open globe injuries were frequently linked to worse visual prognoses<sup>19,20</sup>.

The average time of hospital presentation was 13.4 (7.6) hours, and almost half the patients' reported presentations between 7-24 hours of injury. Nevertheless, the percentage of patients who came after 24 hours was 23.5% and this could be a factor in worse visual outcomes. It has also been highlighted in past studies that late arrival at health institutions is a major parameter that is related to poor prognosis of ocular trauma<sup>21</sup>. The outcome analysis in terms of visual results showed that almost 50 percent of patients with severe visual conditions were observed on the very first account (47.1). Following treatment, it was found that 45.9% of patients showed an improvement in visualization and 32.9% showed no improvement and 21.2% had a deterioration in the vision. The same results have been observed in the past studies in which visual

recovery was highly dependent on the severity and nature of the injury and the timeliness of the treatment<sup>22</sup>. In general, the results of the present research indicate that ocular trauma is one of the major causes of visual impairment, especially in young adults. The prevention methods like community education, occupational safety precautions, and timely provision of specialized ophthalmic treatment can be used to prevent the occurrence of ocular trauma and better visual prognosis in victims.

**Limitations:** This research was limited in a number of ways. First, the sample size was very minor and was restricted to patients that were presented to a specific hospital and emergency department which can influence the genericization of the results. Second, not all patients were examined immediately after being injured, and this fact might have affected the observed visual results. Third, the follow-up was not long-term and it was hard to determine the final visual prognosis in every case. Lastly, all patients could not get detailed information on the use of protective eyewear and occupational safety measures.

## CONCLUSION

It is concluded that ocular trauma remains a significant cause of visual impairment, particularly among young adult males. Closed globe injuries were more common than open globe injuries, and domestic as well as occupational accidents represented the most frequent causes of injury. Although visual improvement was achieved in many patients following treatment, a considerable proportion continued to experience poor visual outcomes. Early presentation, prompt management, and preventive strategies such as safety awareness and protective measures are essential to reduce the burden of ocular trauma and improve visual prognosis.

## REFERENCES

1. Andrastea KD, Lienderiwati NM. Mechanical injury predominates in rural Bali, Indonesia: Implications for prevention and treatment of ocular trauma. *J Biomed Transl Res.* 2025;9(2):6209-22.
2. J Liaquat Uni Med Health Sci. Pattern of ocular trauma and visual outcome. *J Liaquat Uni Med Health Sci.* 2025; Online First. doi:10.22442/jlumhs.2025.01347.
3. Mallagundla S, Gupta P, Marijogaiah SS, Hithashree HR, Srinivas KH. A clinical study of childhood penetrating ocular trauma in a tertiary care center in Southern India. *Kerala J Ophthalmol.* 2024;36(1):25-9.
4. Ibukun FA, Ugalahi MO, Bekibele CO. Unilateral visual impairment and blindness in school children—prevalence and aetiology in Saki-East LGA of Oyo State, Nigeria. *Eye.* 2024;1-7.
5. Lee BW, Samarawickrama C. Closed globe and adnexal eye injuries: epidemiology, clinical and surgical outcomes, and an economic cost analysis. *Clin Exp Ophthalmol.* 2023;51(5):425-36.
6. Kinoshita M, Ihara T, Mori T. Characteristics of pediatric ocular trauma in a pediatric emergency department in Japan. *Am J Emerg Med.* 2023;70:75-80.
7. Ugalahi MO, Adebuseye SO, Olusanya BA, Baiyerolu A. Ocular injuries in a paediatric population at a child eye health tertiary facility, Ibadan, Nigeria. *Injury.* 2023;54(3):917-23.
8. Kaginalkar A, Kumar S, Gargava P, Niyogi D. Stakeholder analysis for designing an urban air quality data governance ecosystem in smart cities. *Urban Climate.* 2023;48:101403.
9. Lama PL, Sagno C, Fofana I, Sylla A, Camara S, Sovogui B, et al. Pediatric eye trauma: epidemiological, clinical and therapeutic aspects at CADESSO in Donka, Guinea. *Open J Ophthalmol.* 2022;12(3):284-93.
10. Miller SC, Fliotsos MJ, Justin GA, Yonekawa Y, Chen A, Hoskin AK, et al. Global current practice patterns for the management of open globe injuries. *Am J Ophthalmol.* 2022;234:259-73.
11. Bastola P, Ibrahim A, Michael D, Misghna H, Russom R, Dahal P, et al. Pattern of ocular trauma and visual outcome in patients attending national referral eye hospital of Eritrea. *J Chitwan Med Coll.* 2021;11(3):80-7.
12. Webber AL, Sharwood P. Practical use and prescription of ocular medications in children and infants. *Clin Exp Optom.* 2021;104(3):385-95.
13. Madan AH, Joshi RS, Wadekar PD. Ocular trauma in pediatric age group at a tertiary eye care center in Central Maharashtra, India. *Clin Ophthalmol.* 2020;14:1003-9.
14. Jamil AZ, Bahoo ML. Visual outcome of ocular trauma presenting in a tertiary care hospital in Sahiwal. *Pak J Ophthalmol.* 2020;36(2).
15. Prasad R, Tiwari D, Kumari B, Bandyopadhyay A. Pattern of ocular trauma and prediction of final visual outcome in paediatric ocular trauma cases in a tertiary eye care centre of Eastern India. *Ophthalmol Res Int J.* 2020;29-33.
16. Sii F, Barry RJ, Abbott J, Blanch RJ, MacEwen CJ, Shah P. The UK Paediatric Ocular Trauma Study 2 (POTS2): demographics and mechanisms of injuries. *Clin Ophthalmol.* 2018;12:105-11.
17. Murya RP, Kumar A, Singh VP, Mishra C, Jain P, Bhushan P, et al. Pattern of pediatric ocular trauma in Eastern Uttar Pradesh. *Indian J Clin Exp Ophthalmol.* 2017;3(3):252-8.
18. Singh S, Sharma B, Kumar K, Dubey A, Ahirwar K. Epidemiology, clinical profile and factors predicting final visual outcome of pediatric ocular trauma in a tertiary eye care center of Central India. *Indian J Ophthalmol.* 2017;65(11):1192-7.
19. Chakraborti C, Giri D, Choudhury KP, Mondal M, Datta J. Paediatric ocular trauma in a tertiary eye care center in Eastern India. *Indian J Public Health.* 2014;58(4):278-80.
20. Zhang L, Liu Y, Chen S, Wang Y. Clinical observation of vitreous surgery for open-globe injuries at different timing after trauma. *Zhonghua Yan Ke Za Zhi.* 2014;50(2):121-5.
21. Clayfield-Hoskin AK. Defining and rectifying the gaps in our ability to record and measure eye injuries internationally. Doctoral dissertation.
22. Teoh LJ. Secondary healthcare use and health outcomes of children with eye and vision disorders in England. Doctoral dissertation, UCL.