

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 ± 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 ± 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, contributing significantly to the burden of eye disease worldwide.¹ Eye injuries may occur at home, at work, on roads, or during recreation, and can range from superficial trauma to severe globe damage leading to irreversible vision loss.² The eye is a highly specialized and delicate organ; even minor trauma can cause serious functional loss without timely diagnosis and treatment.³ Ocular trauma is especially common in developing countries where occupational exposures, low safety awareness, and lack of protective equipment increase the risk of injury.^{4,5} It also represents a significant socioeconomic and public health issue, especially in young adults of working age.⁶ Late presentation to healthcare facilities further increases the risk of permanent visual disability.⁷

Ocular injuries are typically classified into open and closed globe injuries based on eyewall integrity,⁸ with closed globe injuries such as contusions and lamellar lacerations and open globe injuries like full-thickness corneoscleral wounds often having worse prognosis.⁹ Chemical injuries, intraocular foreign bodies, and orbital trauma also contribute to ocular morbidity.¹⁰ Timely evaluation, accurate classification, and prompt treatment are critical to prevent chronic complications and optimize visual outcomes in emergency settings.¹¹ Microsurgical advances have improved management, but serious cases still present challenges in achieving optimal recovery.¹²

Studies have shown that injury type and severity, interval to treatment, and availability of specialized care significantly influence final visual outcomes,¹³ while early management and surgical intervention can considerably improve visual recovery.¹⁴ Preventive strategies such as protective eyewear and occupational safety measures are essential for reducing ocular trauma incidence.¹⁵ Knowledge of ocular trauma trends, causes, and consequences is vital for prevention strategies and improved care.¹⁶ Hospital-based epidemiologic data help identify injury patterns, risk factors, and visual outcomes.¹⁷

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.

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%)
Place of Injury	Domestic accident	24 (28.2%)
	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	≤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%)

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 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 study assessed the pattern and visual outcomes of ocular trauma among patients presenting to an emergency department. The average age of patients was 27.6 ± 14.2 years, with the 16–30 years age group most frequently affected (42.4%). Males were predominantly affected (71.8%) compared with females (28.2%). This aligns with previous studies indicating that ocular trauma is more prevalent in young males due to higher outdoor activity, occupational exposure, and risk-prone behavior.^{4,5,6}

Domestic accidents (28.2%) and occupational injuries (24.7%) were the leading causes of trauma, followed by road traffic accidents (20.0%) and assaults (16.5%). Most injuries occurred at home (34.1%) and workplaces (27.1%). These findings are consistent with prior research emphasizing domestic and workplace environments as the primary sites of ocular injuries, particularly in regions with minimal occupational safety measures.^{4,15}

Closed globe injuries were more common (61.2%) than open globe injuries (38.8%). Among closed globe injuries, contusions (32.9%) and lamellar lacerations (28.2%) were the most frequent, while penetrating injuries (24.7%) dominated the open globe category. Similar trends have been reported in earlier studies, where closed globe injuries are more frequent, although open globe injuries often result in worse visual prognosis.^{8,9,10}

The mean hospital presentation time was 13.4 ± 7.6 hours, with nearly half presenting within 7–24 hours. Delayed presentation beyond 24 hours occurred in 23.5% of patients, which could negatively affect visual outcomes. Previous studies have also highlighted that late arrival at healthcare facilities is a significant predictor of poor prognosis in ocular trauma.^{7,13}

Visual outcome analysis showed that 47.1% of patients initially had severe visual impairment (<6/60). Following management, 45.9% of patients improved, 32.9% remained unchanged, and 21.2% worsened. These results are consistent with literature demonstrating that visual recovery depends on injury severity, type, and promptness of treatment.^{12,14,16,17}

Overall, this study confirms that ocular trauma is a major cause of visual impairment, particularly among young adult males. Preventive strategies including community education, occupational safety precautions, and timely specialized ophthalmic care can help reduce ocular trauma incidence and improve visual outcomes.^{15,16}

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.

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