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Original Article

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Clinical Characteristics of Patients with Open Globe Injuries in Tertiary Care Centre

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ABSTRACT

Background: Open Globe Injuries (OGIs) are severe ocular traumas that can result in significant visual impairment. A comprehensive understanding of the sociodemographic profile, causative factors, and clinical features is crucial to optimize management and prevention strategies.

Methods: A prospective study was conducted at the Vijayanagar Institute of Medical Sciences, Bellary, from June to October 2022. The study included 30 cases of OGIs, with patients of all age groups. Patients with pre-existing ocular diseases affecting visual acuity were excluded.

Results: The majority of the patients were males (76.7%) and children aged 0-9 years (40%). Most injuries occurred in rural settings (53.3%) and were predominantly caused by sticks (50%). Half of the patients presented with injuries to either eye. Initial visual acuity was predominantly hand motion perception (23.3%) or perception of light (20%). The most common corneal tear sizes were 4 mm (33.3%) and 8 mm (30%). Iris prolapse was observed in 53.3% of cases, while traumatic cataract was present in 66.7%. All patients required surgical intervention.

Conclusion: OGIs present a significant clinical and public health challenge. Recognizing the demographics, common causative factors, and clinical characteristics is pivotal for developing effective preventive measures and improving patient outcomes.

Key Words: *Open Globe Injuries, Ocular Trauma, Clinical Characteristics, Tertiary Care Centre, Epidemiology*

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INTRODUCTION

Open Globe Injuries (OGIs) are serious ocular traumas that carry substantial risk for vision loss and ocular morbidity [1]. The term 'Open Globe Injury' is broadly used to describe full-thickness wounds of the eye wall, typically resulting from sharp object penetration or blunt trauma [2]. The clinical presentation, management and prognosis of OGIs are influenced by several factors, including the nature, location, and extent of the injury, the patient's age, the time elapsed before medical intervention, and the presence of any associated ocular or systemic conditions [3].

The incidence of OGIs has been reported variably worldwide. In the United States, OGIs account for approximately 3.5% of all eye injuries presenting to emergency departments, with a higher prevalence noted among males and young adults [4]. Globally, work-related accidents and domestic incidents constitute significant causes of OGIs [5]. However, the demographic distribution, etiological factors, and clinical characteristics of OGIs may differ according to geographical location, socioeconomic conditions, and cultural practices [6].

A thorough understanding of the clinical characteristics of patients with OGIs is crucial for the development of preventative strategies, early detection, appropriate management, and rehabilitation plans. Many studies have investigated these aspects in different parts of the world. However, there is a paucity of research focusing on OGIs in the context of tertiary care centers [7]. These centers are often the first point of contact for severe and complex cases, thus providing a unique perspective on the clinical profile and management of OGIs.

This study aims to explore the clinical characteristics of patients with OGIs presenting to a tertiary care center. This includes assessing demographic factors, mechanisms of injury, associated ocular findings, interventions performed, and visual outcomes. Our goal is to enhance the understanding of the clinical epidemiology of OGIs in this setting, thereby informing preventative and therapeutic measures and ultimately improving patient outcomes.

Aims and Objectives

- To ascertain the sociodemographic profile,

- To examine the clinical characteristics of open globe injury,
- To evaluate the therapeutic measures undertaken
- To assess the prognostic factors for the visual outcome in such cases.

MATERIALS AND METHODS

Study Design and Duration

This is a prospective observational study conducted over a period of five months, from June 2022 to October 2022.

Study Setting

The study was carried out in the Department of Ophthalmology at Vijayanagar Institute of Medical Sciences (VIMS), Bellary, a tertiary care center that handles a diverse range of ocular conditions and emergencies.

Sample Size

A total of 30 individual cases of Open Globe Injuries (OGIs) presenting during the study period were included.

Inclusion Criteria

- Patients of all age groups who sustained ocular injuries of the open globe type.
- Patients presenting to the Ophthalmology Department at VIMS, Bellary within the study period.

Exclusion Criteria

- Patients previously diagnosed with pre-existing ocular diseases affecting visual acuity were excluded from the study.

This exclusion criterion was adopted to ensure that the visual outcomes assessed could be attributed solely to the OGIs, thereby reducing potential confounding effects.

Data Collection

Patient data were collected prospectively upon their presentation to the department. Information regarding sociodemographic profile, nature and cause of injury, clinical presentation, management strategies employed, and visual outcomes were recorded systematically using a pre-designed proforma. Informed consent was obtained from all patients or their guardians (in case of minors) prior to data collection.

Data Analysis

The collected data were subsequently analyzed to study the sociodemographic profile, clinical characteristics, management, and prognostic factors for visual outcomes in patients with OGIs. Appropriate statistical methods were used for descriptive and inferential analysis.

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of VIMS, Bellary. All procedures performed in the study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

RESULTS

Table 1: Demographic Profile of Patients with Open Globe Injuries

		Count	Column N %
AGE	0-9	12	40.00%
	10-19	6	20.00%
	20-29	3	10.00%
	30-39	2	6.67%
	40-49	3	10.00%
	50-59	4	13.33%
GENDER	Female	7	23.30%
	Male	23	76.70%
LOCALITY	Rural	16	53.30%
	Urban	14	46.70%

This table presents the demographic characteristics of the study participants, including their age, gender, and locality (urban/rural).

In terms of age distribution, a significant proportion of the patients (40.00%) were within the 0-9 years age group. This indicates a high incidence of Open Globe Injuries (OGIs) among children, which may be attributable to their increased exposure to risky environments or activities. The next most affected age group was 10-19 years, accounting for 20.00% of the cases, reflecting the possible influence of adolescent activities on ocular injuries. The least affected age

groups were 20-29 years and 30-39 years, constituting 10.00% and 6.67% of cases, respectively. Patients aged 40-49 years and 50-59 years contributed to 10.00% and 13.33% of cases, respectively.

Regarding gender distribution, males were predominantly affected, comprising 76.70% of the study population. This overrepresentation of males in the sample might reflect gender-specific occupational or recreational activities predisposing them to a higher risk of OGIs. Females represented a smaller proportion of the cases, accounting for 23.30% of the sample.

In terms of locality, the cases were almost evenly distributed between rural (53.30%) and urban (46.70%) areas. However, a slightly higher incidence of OGIs was observed in rural settings, potentially reflecting differences in occupational hazards, access to protective eye wear, or healthcare-seeking behavior between rural and urban populations. In summary, the demographic profile of patients with OGIs in our study is characterized by a high incidence among children, a male predominance, and a slight rural preponderance. These findings could inform targeted prevention and intervention strategies to address the burden of OGIs in these at-risk populations.

Table 2: Clinical Characteristics and Injury Details of Patients with Open Globe Injuries

		Count	Column N %
LATERALITY	Left Eye	15	50.00%
	Right Eye	15	50.00%
OBJECTS CAUSING INJURY	Assault	1	3.30%
	Ball	2	6.70%
	Battery blast	1	3.30%
	Iron rod	1	3.30%
	Metal	1	3.30%
	Rod	2	6.70%
	Steel wire	2	6.70%
	Stick	15	50.00%
	Stone	5	16.70%
PLACE OF INJURY	Farm	5	16.70%
	Playground	2	6.70%
	Residence	8	26.70%
	RTA	5	16.70%
	School	6	20.00%
	Shop	4	13.30%
TIME OF PRESENTATION	<24 Hours	12	40.00%
	>24 Hours	12	40.00%
	24 Hours	6	20.00%
ZONES INVOLVED	1	28	93.30%
	2	1	3.30%
	3	1	3.30%

The table presents a detailed overview of the clinical characteristics and circumstances surrounding the Open Globe Injuries (OGIs) in the study population.

The laterality of the injuries was evenly distributed between the left and right eyes, each constituting 50.00% of cases. This suggests no particular eye predilection in the occurrence of OGIs.

Regarding the objects causing the injuries, the most common object was a stick, accounting for half of the cases (50.00%). This highlights the potential dangers associated with common objects in everyday environments. Stones were the second most common objects causing injury (16.70%), followed by ball, rod, and steel wire each contributing to 6.70% of cases. Battery blast, assault, iron rod, and metal each accounted for 3.30% of the injuries.

The place of injury was varied, with the highest percentage of injuries occurring at residences (26.70%), followed by schools (20.00%). Injuries at farms and during road traffic accidents (RTAs) each accounted for 16.70% of cases, while injuries at shops and playgrounds contributed to 13.30% and 6.70% of the cases, respectively.

The timing of presentation to the healthcare facility was equally divided between patients presenting within less than 24 hours (40.00%), more than 24 hours (40.00%), and exactly at 24 hours (20.00%) post-injury.

In terms of the anatomical zones of the eye involved, the majority of the cases (93.30%) involved Zone 1, which corresponds to injuries involving the cornea and limbus. This may reflect the vulnerability of the anterior part of the eye during traumatic incidents. Injuries involving Zones 2 and 3, representing more posterior sections of the eye, were much less common, each accounting for 3.30% of cases.

In summary, the data reveal a wide variety of objects and locations associated with OGIs, an evenly distributed injury presentation time, and a high prevalence of injuries involving the anterior section of the eye. This information is vital for developing effective preventive measures and for informing public health initiatives aimed at reducing the incidence of OGIs.

Table 3: Initial Visual Acuity, Injury Characteristics, and Complications in Patients with Open Globe Injuries

		Count	Column N %
INITIAL VA	6/36	4	13.30%
	6/60	3	10.00%
	CF	5	16.70%
	HM	7	23.30%
	No PL	5	16.70%
	PL	6	20.00%
SIZE OF CORNEAL TEAR	2 mm	2	6.70%
	3 mm	3	10.00%
	4 mm	10	33.30%
	6 mm	1	3.30%
	7 mm	2	6.70%
	8 mm	9	30.00%
	9 mm	3	10.00%
IRIS PROLAPSE	No	14	46.70%
	Yes	16	53.30%
HYPHAEMA	No	15	50.00%
	Yes	15	50.00%
TRAUMATIC UVEITIS	No	30	100.00%
TRAUMATIC CATARACT	No	10	33.30%
	Yes	20	66.70%
IOFB	ISFB	1	3.30%
	No	29	96.70%
VH	No	28	93.30%
	Yes	2	6.70%
ENDOPH	No	30	100.00%
TON	No	30	100.00%

This table delineates the initial visual acuity (VA), characteristics of the ocular injury, and associated complications in the study cohort.

Concerning initial VA, the highest percentage of patients (23.30%) presented with hand motion (HM) perception, followed by perception of light (PL) (20.00%), counting fingers (CF) and no perception of light (No PL) each contributing to 16.70% of cases. A smaller proportion of patients presented with visual acuity of 6/36 and 6/60, contributing to 13.30% and 10.00% of the cases, respectively.

The size of the corneal tear varied across the study population. The most common sizes were 4 mm and 8 mm, seen in 33.30% and 30.00% of cases respectively. Tear sizes of 3 mm and 9 mm each accounted for 10.00% of cases, while tear sizes of 2 mm, 6 mm, and 7 mm were less common, each contributing to 6.70% of the injuries.

Approximately half of the patients (53.30%) presented with iris prolapse, indicative of the severity of some of the injuries. Hyphema, or blood in the anterior chamber of the eye, was present in 50.00% of cases, further indicating the extent of trauma in these patients.

Traumatic cataract was evident in 66.70% of the patients, suggesting a high prevalence of lens damage following OGIs. Conversely, traumatic uveitis was not observed in any of the patients in this sample.

Intraocular foreign body (IOFB) was rare, with only one case (3.30%) of intra-scleral foreign body (ISFB) reported. The vast majority of patients (96.70%) did not have any IOFB.

Vitreous hemorrhage (VH) was seen in a minor proportion of patients (6.70%), while endophthalmitis (ENDOPH) and traumatic optic neuropathy (TON) were not reported in any of the cases in this study.

In summary, these findings illustrate a range of visual acuity at presentation, varied sizes of corneal tear, and a considerable frequency of associated complications such as iris prolapse, hyphema, and traumatic cataract. The insights gleaned from this data can facilitate a deeper understanding of the complexities associated with OGIs and can guide clinicians in providing comprehensive care to these patients.

Table 4: Diagnosis and Treatment of Patients with Open Globe Injuries

		Count	Column N %
DIAGNOSIS	FT WITH IP, TC AND VH	1	3.30%
	FT WITH LID TEAR	1	3.30%
	FTCT	9	30.00%
	FTCT WITH IRIS PROLAPSE	15	50.00%
	FTCT WITH TC	4	13.30%
TREATMENT	SURGICAL	30	100.00%

This table outlines the final diagnoses of the patients in the study and the treatment modalities utilized.

In terms of diagnosis, the majority of the patients (50.00%) were diagnosed with full-thickness corneal tear (FTCT) with iris prolapse. The second most common diagnosis was isolated FTCT, accounting for 30.00% of cases. A smaller proportion of patients were diagnosed with FTCT with traumatic cataract (TC), contributing to 13.30% of the cases. Single cases (3.30% each) were noted with a diagnosis of full-thickness (FT) injury with iris prolapse (IP), TC and vitreous hemorrhage (VH), and FT injury with lid tear.

As for the treatment of patients with OGIs, all patients (100%) in the study underwent surgical intervention, reflecting the severity of the injuries and the necessity for invasive management to preserve and restore visual function.

In conclusion, the data demonstrates the variety of presentations and diagnoses associated with OGIs, while also emphasizing the critical role of surgical intervention in the management of these complex injuries. This knowledge can assist clinicians in the prompt recognition and treatment of OGIs, ultimately aiming at optimal visual outcomes for these patients.

Table 5: Initial Visual Acuity by Time of Presentation in Patients with Open Globe Injuries

		TIME OF PRESENTATION					
		<24 Hours		>24 Hours		24 Hours	
		Count	Column N %	Count	Column N %	Count	Column N %
INITIAL VA	6/36	0	0.0%	1	8.3%	3	50.0%
	6/60	2	16.7%	0	0.0%	1	16.7%
	CF	0	0.0%	5	41.7%	0	0.0%
	HM	6	50.0%	0	0.0%	1	16.7%
	No PL	2	16.7%	2	16.7%	1	16.7%
	PL	2	16.7%	4	33.3%	0	0.0%

This table illustrates the initial visual acuity (VA) of patients according to their time of presentation to the healthcare facility.

Among patients who presented within less than 24 hours, the highest percentage (50.00%) had visual acuity at the level of hand motion (HM) perception. Another 16.7% each had visual acuity at the level of 6/60, no perception of light (No PL), and perception of light (PL). None of the patients in this group had a visual acuity of 6/36 or were able to count fingers (CF).

Patients who presented after 24 hours had a different distribution of initial VA. The highest proportion (41.7%) had a visual acuity at the level of counting fingers (CF), followed by 33.3% who had perception of light (PL). An equal proportion of patients (16.7% each) had a visual acity of 6/36 and no perception of light (No PL). None of the patients in this group had a visual acuity of 6/60 or hand motion (HM) perception.

In the group that presented exactly at 24 hours, an equal proportion of patients (50.0%, 16.7%, and 16.7%) had a visual acuity of 6/36, 6/60, no perception of light (No PL), and hand motion (HM) perception. None of the patients in this group had the ability to count fingers (CF) or had perception of light (PL).

In summary, the data reveals a varied distribution of initial visual acuity in relation to the time of presentation, underscoring the potential impact of time-sensitive management on the visual outcome in patients with open globe injuries.

DISCUSSION

Our study provides a comprehensive analysis of the clinical characteristics of patients with open globe injuries (OGIs) presenting to a tertiary care center. The findings from this study, in conjunction with previous research, offer a multifaceted understanding of the sociodemographic profile, injury characteristics, and visual outcomes associated with OGIs.

The age distribution of the patients in this study was varied, with a higher proportion of injuries seen in younger individuals, particularly in the 0-9 age group. This is consistent with prior studies, which have also reported a higher incidence of ocular trauma in children and young adults [8, 9]. This highlights the need for targeted preventive measures, especially in younger age groups, to mitigate the risk of these injuries.

The gender distribution in our study, with a higher prevalence of OGIs in males, aligns with previous reports that have identified male gender as a risk factor for ocular trauma [10]. The predominance of injuries in rural locations in our study, which accounted for over half of the cases, underscores the potential challenges faced in these regions, including limited access to eye protection and higher engagement in risk-associated activities [11].

Regarding the nature and characteristics of the injuries, the most frequent object causing the injury was a stick, which is in line with other studies that have reported similar findings [12]. The most common place of injury was the residence, followed by schools and farms, which suggests the need for increased awareness and safety measures in these environments [13].

In terms of initial visual acuity, a significant proportion of patients presented with hand motion perception, similar to findings from a study by Soylu et al., where approximately 42.8% of patients presented with hand motions or worse visual acuity [14]. The size of the corneal tear varied across the study population, with the most common sizes being 4 mm and 8 mm. In contrast, a study by Serrano et al. reported smaller average wound sizes, around 2.9 mm, underscoring the severity of injuries in our cohort [15].

Iris prolapse, present in over half of our patients, is a concerning finding given its association with poor visual outcomes [16]. The high prevalence of traumatic cataract in our study aligns with previous reports, further emphasizing the impact of ocular trauma on lens integrity [17].

All patients in this study required surgical intervention, reaffirming the severity of OGIs and the need for prompt surgical management. Studies have highlighted the role of early surgical intervention in achieving optimal visual outcomes, especially in cases with additional complications such as iris prolapse and hyphema [18, 19].

In conclusion, our study underscores the clinical complexities and management challenges associated with OGIs. Recognizing the diverse presentation and complications of these injuries can facilitate prompt diagnosis, appropriate management, and potentially improved visual outcomes. Further research is needed to develop and implement effective preventative strategies targeting high-risk populations and environments.

CONCLUSION

Open Globe Injuries (OGIs) present a significant public health challenge due to their potential for causing severe visual impairment. Our study, centered in a tertiary care setting, reinforces the significant clinical burden of OGIs, elucidating notable aspects of their sociodemographic distribution, causative factors, and associated complications.

The patient demographic profile, predominantly featuring younger males from rural settings, underscores the need for targeted, demographic-specific prevention strategies. This is particularly crucial given the substantial involvement of commonplace objects and environments in the causation of these injuries, such as sticks and domestic settings.

The severity of OGIs, evidenced by the high prevalence of complications like iris prolapse and traumatic cataract, as well as the universal necessity for surgical intervention, signifies the urgency of prompt and comprehensive medical care. Early identification and appropriate management of these injuries are crucial to mitigate the risk of permanent visual loss and optimize patient outcomes.

Further research is needed to delve deeper into effective preventative strategies, focusing on high-risk groups and common environments associated with these injuries. Enhancing public awareness about the risk factors and preventative measures for ocular trauma, especially in identified high-risk demographics and settings, can go a long way in reducing the incidence and improving the prognosis of these potentially devastating injuries.

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