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Original Research Article

Visual Improvement in Patients With Blunt Traumatic Hyphema After 01 Week

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Abstract: *Blunt traumatic hyphema, characterized by hemorrhage in the anterior chamber of the eye due to non-penetrating trauma, is a common ocular emergency with significant implications for visual outcomes. In Pakistan, trauma-related eye injuries are prevalent, particularly among younger males. Early intervention and prompt management play a critical role in visual recovery.* ***Objective:*** *To evaluate the frequency and degree of visual improvement in patients presenting with blunt traumatic hyphema after one week of treatment.* ***Methods:*** *This descriptive observational study was conducted at the Department of Ophthalmology, Ayub Teaching Hospital, Abbottabad, over the period of 3 months from 28 February to 28 May 2025. A total of 161 patients aged 4–40 years presenting within 24 hours of blunt ocular trauma were enrolled using a non-probability consecutive sampling technique. Baseline ophthalmologic examination included visual acuity assessment (Snellen chart), grading of hyphema, intraocular pressure measurement, and dilated fundus examination. Visual improvement was categorized as minimal (20/40–20/30), moderate (20/80–20/40), or significant (20/200–20/50 or better) after one week of follow-up. Data were analyzed using SPSS v20 with chi-square tests applied to determine associations; $p<0.05$ was considered significant.* ***Results:*** *The mean age of participants was 21.3 ± 8.7 years; 74.5% were male. Most injuries (48.4%) occurred during recreational activities. At baseline, 26.1% had vision 20/200 or worse. After one week, 67.1% of patients showed significant improvement, 19.3% moderate, and 13.6% minimal or no improvement. Grade I hyphema was significantly associated with better visual recovery ($p<0.01$).* ***Conclusion:*** *A majority of patients with blunt traumatic hyphema showed marked visual improvement within one week of prompt ophthalmic intervention. Early presentation, low-grade hyphema, and immediate care are key factors associated with favorable outcomes. Public awareness, timely medical attention, and targeted preventive measures are essential to reduce the burden of trauma-induced ocular morbidity in Pakistan.*

Keywords: Blunt ocular trauma, hyphema, visual acuity, visual improvement, traumatic eye injury, Pakistan

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Introduction

Blunt traumatic hyphema is a significant clinical entity that affects individuals across various demographics, including the Pakistani population. Traumatic hyphema is defined as the presence of blood in the anterior chamber of the eye, typically resulting from blunt ocular trauma. The severity of this condition can vary substantially, impacting not just the physical attributes of the eye but also the visual outcomes for affected patients. In Pakistan, where the incidence of ocular trauma is notable, understanding the recovery process after blunt traumatic hyphema is vital in formulating effective treatment protocols and improving patient management strategies.

The visual prognosis following blunt traumatic hyphema is influenced by several factors including the mechanism of injury, the initial grade of hyphema, and any concomitant ocular injuries. According to a study from a reference ophthalmological clinic, visual outcomes significantly decline as the severity of trauma increases, suggesting that timely intervention is crucial for optimal recovery (1). The underlying mechanisms of injury, particularly in a context like Pakistan where sports and occupational hazards contribute significantly to eye injuries, necessitate further investigation into the trauma patterns observed (2). Furthermore, literature indicates that the presence of additional injuries—such as lens displacement or retinal damage—can correlate with poorer visual outcomes, emphasizing the need for comprehensive evaluations of eye injuries (3).

Rationale for this study stems from the urgent need to enhance understanding of the recovery trajectory following blunt traumatic hyphema in the Pakistani population, especially given that existing studies often focus on disparate geographical areas with varying healthcare standards. By investigating visual improvement one week post-injury, this study aims to bridge the knowledge gap regarding the effectiveness of immediate treatment responses in Pakistani patients. Studies have illustrated that in pediatric populations, particularly, timely management can lead to substantial improvements in visual acuity, underscoring the potential development of standardized treatment protocols (4). Additionally, the investigation aligns with findings emphasizing the role of timely intervention in mitigating long-term visual impairments associated with hyphema (5,6).

Thus, this study on visual improvement in patients with blunt traumatic hyphema after one week is pivotal not only for clinical understanding but also for establishing tailored rehabilitation strategies within the Pakistani healthcare framework. A comprehensive analysis of patient data can lead to nuanced insights that promote better clinical outcomes and potentially reduce the incidence of preventable blindness due to ocular trauma.

Methodology

This descriptive, observational study was conducted at the Department of Ophthalmology, Ayub Teaching Hospital, Abbottabad, over a period of 3 months from 28 February to 28 May 2025, following approval of the research synopsis. The study aimed to evaluate the frequency of visual improvement in patients presenting with blunt traumatic hyphema after one week of treatment. A total of 161 patients were enrolled in the study based on the calculated sample size using the WHO sample size calculator, assuming a confidence level of 95%, an anticipated proportion of visual improvement of 71.4%, and an absolute precision of 7%.

Participants were selected using a non-probability consecutive sampling technique. The inclusion criteria were patients aged between 4 and 40 years who presented with hyphema due to blunt ocular trauma within 24 hours of injury. Both male and female patients were included. Patients

were excluded if they had concurrent penetrating injuries, presented more than 24 hours after the trauma, had additional ocular injuries precluding visual acuity assessment, or had a history of previous ocular pathology affecting vision.

Upon presentation, all patients underwent a detailed ophthalmic examination, which included assessment of visual acuity using Snellen charts, slit-lamp biomicroscopy, intraocular pressure measurement, and dilated fundus examination. The grade of hyphema was assessed using standard clinical classification. Visual acuity was recorded at the time of initial presentation and reassessed after a minimum follow-up period of one week.

Informed written consent was obtained from all participants or their guardians after explaining the purpose and protocol of the study. Baseline demographic data such as age, gender, occupation, education level, socioeconomic status, monthly income, and place of residence were recorded. All data were documented using a predesigned proforma and collected by the principal investigator.

The outcome variable, visual improvement, was categorized based on Snellen chart readings into three groups: minimal improvement (20/40–20/30), moderate improvement (20/80–20/40), and significant improvement (20/200–20/50 or better). Data were entered and analyzed using SPSS version 20. Categorical variables such as gender, education level, occupation, type of trauma, and visual improvement categories were presented as frequencies and percentages. Quantitative variables like age and monthly income were expressed as mean ± standard deviation or median and interquartile range, depending on data distribution assessed via the Shapiro-Wilk test.

Stratification was performed to control for potential confounding variables such as age, gender, and grade of hyphema. Post-stratification comparisons were made using the chi-square test or Fisher's exact test where applicable. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 161 patients with blunt traumatic hyphema were included in the study. The mean age of patients was 21.3 ± 8.7 years, ranging from 4 to 40 years. Of the participants, 74.5% were male and 25.5% were female, reflecting a higher prevalence of ocular trauma among males in this Pakistani population. (Table1)

Table 1: Demographic Profile of the Study Population (n=161)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	120	74.5%
Female	41	25.5%
Age Group (years)		
4–10	14	8.7%
11–20	55	34.2%
21–30	50	31.1%
31–40	42	26.1%
Residence		
Urban	95	59.0%
Rural	66	41.0%
Education Level		
Illiterate	24	14.9%
Primary	36	22.4%
Secondary	58	36.0%
Higher secondary and above	43	26.7%
Socioeconomic Status		
Low	87	54.0%
Middle	60	37.3%
High	14	8.7%

Table 2: Distribution of Causes of Trauma and Objects Involved (n=161)

Cause/Object of Trauma	Frequency (n)	Percentage (%)
Playing (stick/stone injury)	78	48.4%
Road traffic accident	31	19.3%
Physical assault (fist/blunt hit)	28	17.4%
Occupational (tools, machinery)	13	8.1%
Others/Unknown	11	6.8%

Most injuries occurred during recreational activities (48.4%), particularly among children and young adults, showing a need for better supervision and protective measures in schools and homes. (Table 2)

Visual improvement was assessed based on Snellen chart scores at presentation and after 1 week. Categories were defined as Minimal (20/40–20/30), Moderate (20/80–20/40), and Significant (20/200–20/50 or better) improvement. (Table 3)

Table 3: Visual Acuity at Presentation (n=161)

Visual Acuity Category	Frequency (n)	Percentage (%)
20/200 or worse	42	26.1%
20/80–20/200	67	41.6%
20/40–20/80	38	23.6%
20/30 or better	14	8.7%

Table 4: Visual Acuity After 1 Week of Treatment (n=161)

Visual Acuity Category	Frequency (n)	Percentage (%)
Significant improvement	108	67.1%
Moderate improvement	31	19.3%
Minimal/No improvement	22	13.6%

After one week of medical treatment and observation, 67.1% of patients showed significant improvement, validating early intervention's effectiveness and the reversibility of traumatic hyphema when managed promptly. (Table 4)

Table 5: Association Between Grade of Hyphema and Visual Improvement (n=161)

Grade of Hyphema	Significant Improvement (n=108)	Moderate (n=31)	Minimal (n=22)	p-value
Grade I	69	14	7	<0.01
Grade II	30	11	10	
Grade III	9	6	5	

Lower grades of hyphema (Grade I) had significantly higher rates of visual recovery ($p<0.01$). Advanced grades were associated with poorer recovery, in line with international findings. (Table 5)

This descriptive study from Ayub Teaching Hospital, Abbottabad, confirms that early diagnosis, low-grade hyphema, and prompt ophthalmic care result in favorable visual outcomes in patients suffering from blunt traumatic hyphema. The majority (67.1%) achieved significant visual improvement within one week, especially those with lower-grade injuries and younger age.

Discussion

The findings from our study on blunt traumatic hyphema reveal compelling insights into the demographic characteristics, causes of trauma, and visual outcomes post-intervention, particularly within the context of the Pakistani population. A total of 161 patients were evaluated, highlighting a significant male preponderance (74.5%) in a predominantly young population, with a mean age of 21.3 years. This demographic trend aligns with findings by Timalsina et al., who indicated that traumatic hyphema occurs predominantly in males and is more commonly observed among younger age groups (7). Similarly, studies by Galvis et al. reveal that many hyphema cases arise from recreational activities, emphasizing the need for improved safety protocols in schools and during sports (8).

In terms of causes, our data reveal that the majority of injuries (48.4%) resulted from playing (stick/stone injuries), followed by road traffic accidents (19.3%) and physical assaults (17.4%). This distribution reflects local societal and environmental factors influencing injury patterns, which are also noted in studies that highlight the commonality of trauma during recreational activities (9). Such observations can help inform public health interventions focused on education and safety regulations.

Our findings on visual acuity before and after one week of treatment demonstrate a significant recovery among patients, with 67.1% exhibiting improvement. This outcome is consistent with existing literature suggesting that early intervention in blunt traumatic hyphema enhances visual prognosis. For instance, Boese et al. corroborate this by indicating that prompt treatment benefits visual recovery, particularly in pediatric populations (10). Furthermore, lower-grade hyphema patients (Grade I) were found to have significantly higher rates of visual recovery ($p<0.01$), resonating with the conclusions drawn by Gharaibeh et al., who observed that the severity of hyphema directly influences clinical outcomes and recovery trajectory (11).

Moreover, our study reinforces the assertion substantiated by international research that highlights the correlation between age, injury grade, and recovery speed. Younger patients tended to experience more favorable outcomes, consistent with the findings of Aygün et al., who identified age as a critical factor in managing and predicting outcomes of post-traumatic hyphema (12). Similarly, the outcomes align with standards asserting that timely ophthalmic intervention can mitigate potential complications associated with traumatic hyphema, such as secondary glaucoma and corneal blood staining (11)S.

Thus, this study not only consolidates existing knowledge about blunt traumatic hyphema but also illustrates the contextual factors at play in the Pakistani population. The early diagnosis and treatment approach reflected in our outcomes advocate for immediate care protocols, potentially reducing long-term complications and improving visual results. The necessity for enhanced public health strategies aimed at preventing ocular trauma in high-risk demographic groups is underscored, paving the way for further research and targeted regulatory measures.

Conclusion

This study underscores the importance of early diagnosis and intervention in managing blunt traumatic hyphema. A significant proportion of patients—particularly those with Grade I hyphema—achieved notable visual improvement within one week of injury, reinforcing the reversibility of trauma-related vision loss when managed promptly. The findings highlight the need for structured treatment protocols and public health initiatives aimed at injury prevention, particularly in children and young adults engaged in recreational activities. These insights are critical for clinicians and healthcare policymakers in Pakistan striving to improve ocular trauma outcomes and reduce preventable blindness. Future research should explore long-term visual recovery and evaluate the impact of different therapeutic modalities to enhance patient care.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-MMS-033-24)

Consent for publication
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The authors declared the absence of a conflict of interest.

Author Contribution

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AZK (Associate Professor)
Study Design, manuscript review, critical input.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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