




Original Article

An Observational Study to Assess the Visual Outcome Following the Management of Hyphema in Patients with Blunt Trauma

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ABSTRACT

Purpose: To assess the visual acuity of a patient presenting with hyphema due to blunt ocular injury and the visual outcome following the management of hyphema.

Methods: This prospective observational study was conducted at PES Institute of Medical Sciences and Research, Kuppam, over three months. Fifty patients aged 10–50 years with hyphema due to blunt ocular trauma were included. Patients with posterior segment pathology or requiring surgical intervention were excluded. All patients underwent detailed ocular examination, including best corrected visual acuity (BCVA) and slit-lamp evaluation. Follow-up assessments were performed weekly for four weeks and continued up to three months. Visual acuity was recorded and hyphema graded based on anterior chamber involvement.

Results: Among 50 patients, 86% were males, with the majority (46%) aged below 20 years (mean age 26.54 ± 12.83 years). Sports-related injuries, assaults, and accidental trauma were the most common causes. Grade 2 hyphema was most frequent (52%). At presentation, most patients had visual acuity between 6/9 and 6/36. During follow-up, significant improvement was observed ($p < 0.001$), with 50% achieving 6/6 vision and 28% achieving 6/9. Complications were minimal, with only 2% each showing corneal blood staining and angle recession.

Conclusion: Early and appropriate management of hyphema following blunt ocular trauma results in favorable visual outcomes. Lower grades of hyphema are associated with better prognosis, highlighting the importance of timely intervention and preventive measures.

Keywords: Hyphema; blunt ocular trauma; visual outcome; anterior chamber; visual acuity.

INTRODUCTION

Ocular trauma remains a significant public health concern and an important cause of preventable visual morbidity worldwide, particularly in developing countries like India. Epidemiological data suggest that the prevalence of ocular injuries in India is approximately 3.75%, with a considerable proportion resulting in visual impairment or blindness. Blunt ocular trauma is a frequent mechanism of injury, commonly associated with sports-related activities (such as volleyball, tennis, and cricket), domestic accidents, and interpersonal violence. The impact of such injuries is often underestimated despite their potential to cause both immediate and long-term visual sequelae, thereby necessitating timely evaluation and appropriate management.^{1 2}

Hyphema, defined as the accumulation of blood within the anterior chamber of the eye, is one of the most common manifestations of blunt ocular trauma. It may be classified as primary (occurring immediately following injury), secondary (typically arising between the second and fifth day post-injury), or recurrent, which is relatively rare and may present weeks to months later. Secondary hemorrhage has been reported in 5–30% of cases and is often associated with worse visual outcomes. The underlying pathophysiology involves disruption of vascular structures of the iris, ciliary body, or trabecular meshwork, leading to bleeding into the anterior chamber.^{3 4}

The clinical significance of hyphema lies in its potential complications, which include secondary glaucoma, corneal blood staining, peripheral and posterior synechiae formation, pupillary block, rebleeding, and amblyopia in pediatric patients. The severity of hyphema is commonly graded based on the height of blood in the anterior chamber, ranging from mild to total hyphema, which helps guide management and prognostication. Despite advances in treatment strategies, visual outcomes vary depending on the extent of injury and timely intervention. Therefore, this study aims to evaluate the visual outcomes following the management of hyphema in patients with blunt ocular trauma, contributing to a better understanding of prognosis and guiding clinical practice.^{5 6}

MATERIALS AND METHODS

This prospective observational study was conducted at PES Institute of Medical Sciences and Research, Kuppam, over a period of three months. A total of 50 patients presenting with hyphema secondary to blunt ocular trauma were enrolled in the study.

THE INCLUSION CRITERIA

- Age between 10-50 yrs.
- Patients with hyphema due to blunt ocular injury with or without traumatic mydriasis and sphincter tear.
- Patients with hyphema who did not have any posterior segment ocular pathology.

THE EXCLUSION CRITERIA

- Patients with postoperative hyphema.
- Hyphema with perforating injuries.
- Hyphema secondary to rubeosis iridis or other pathology.
- Patients with already existing ocular pathology.
- Patients who were detected to have posterior segment pathologies like Vitreous hemorrhage or Retinal detachment.
- Patients with hyphema who needed surgical intervention.

METHODOLOGY

• All subjects shall be selected only after they provide informed consent for entry to the study. All patients shall undergo a complete ocular examination (which includes Best corrected visual acuity), slit lamp examination, ophthalmoscopy of the other eye with clear media, B-scan biometry. The visual acuity and the above mentioned investigations during presentation was recorded and serial assessment was done every week for 4 weeks (after 1st week, 2nd week, 3rd week and 4th week) Such patients were followed up for a period of 3 months.

Statistical analysis Data obtained from the study were entered into a Microsoft Excel spreadsheet and analyzed using IBM SPSS Statistics (version 25.0 or later). Continuous variables, such as age and best corrected visual acuity (BCVA), were summarized using mean and standard deviation (SD), while categorical variables, including gender distribution, mode of injury, and grading of hyphema, were expressed as frequencies and percentages.

Visual acuity measurements recorded at presentation and during follow-up visits were converted into logarithm of the minimum angle of resolution (logMAR) units for statistical comparison. Changes in visual acuity over time (baseline, weekly follow-ups, and at 3 months) were analyzed using paired *t*-test or repeated measures analysis of variance (ANOVA), depending on data distribution. The association between the severity (grade) of hyphema and final visual outcome was assessed using the Chi-square test or Fisher's exact test, as appropriate.

A *p*-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 50 patients presenting with hyphema due to blunt ocular trauma were included in this prospective observational study.

AGE

Age	No. of cases	%
<20	23	46
21-30	7	14
31-40	10	20
>40	10	20
Total	50	100
Mean	26.54	
SD	12.838	

There is an increased incidence of ocular trauma among the teenage group. This might be due to sports injury

SEX

SEX	No. of cases	%
Male	43	86
Female	7	14
Total	50	100

In our study, we found out that males are more injured when compared to female. This may be due to increased outdoor activities among them.

LATERALITY

Laterality	No. of cases	%
Left Eye	25	50
Right Eye	25	50
Total	50	100

Both the eyes are affected equally in our study

MODE OF INJURY

Mode of Injury	No. of Cases	Percentage(%)
Assault	5	10
Cricket Ball	4	8
Cricket Bat	4	8
Door	3	6
Hand	5	10
RTA	5	10
Wooden Stick	5	10
Volley Ball	4	8
Tennis Ball	3	6
Plastic Ball	3	6
Self Fall	4	8
Shuttle Bat	3	6
Cracker Burst	2	4
Total	50	100

In our study we found out that the predominant mode of injury was due to sports equipments, hand assault and stationaries. Hence care must be taken to avoid these mode of injuries.

VISION AT PRESENTATION

Vision at Presentation	No. of cases	Percentage
PL+	2	4
1/60	1	2
3/60	1	2
4/60	1	2
5/60	1	2
6/60	3	6
6/36	8	16
6/24	9	18
6/18	9	18
6/12	7	14
6/9	8	16
Total	50	100

In our study, we found out that most of the patients with blunt ocular injury presented to us with a vision of 6/18, 6/24, 6/36, 6/9 and 6/12. Very few patients presented with very poor vision when the injury was confined to anterior segment

HYPHEMA GRADING

HYPHEMA GRADE	No. of cases	Percentage
1	10	20
2	26	52
3	11	22
4	3	6
Total	50	100

In our study, most of the patients presented with Grade 2 hyphaema, very few of them presented with Grade 4 hyphaema.

COMPLICATIONS

COMPLICATIONS	No. Of Cases	%
Cornea blood staining	1	2
Angle recession	1	2
Nil	48	96
Total	50	100

In our study involving patients with anterior segment injuries, majority of the patients did not have any complications during follow up. Very few patients had complications like corneal blood staining or Angle recession.

PRESENCE OF TRAUMATIC MYDRIASIS OR SPHINCTER TEAR

Traumatic mydriasis or spinchter tear	No. of cases	%
YES	6	12
NO	44	88
TOTAL	50	100

In our study, very few patients had traumatic mydriasis or sphincter tear associated with hyphema.

VISION DURING FOLLOW UP

Vision during Follow up	No. of Cases	Percentage(%)
6/6	25	50
6/9	14	28
6/12	5	10
6/24	2	4
6/36	4	8
Total	50	100

In our study most patients regained a vision of 6/6 or 6/9 during follow up.

VISION AT PRESENTATION AND FOLLOW UP

VISION	AT PRESENTATION	AFTER FOLLOWUP
PL+	2	0
1/60	1	0
3/60	1	0
4/60	1	0
5/60	1	0
6/60	3	0
6/36	8	4
6/24	9	2
6/18	9	0
6/12	7	5
6/9	8	14
6/6	0	25
P VALUE	<0.001 Significant	

In our study, following treatment 25 patients showed an improvement in visual acuity to 6/6. 14 patients showed a final vision of 6/9. 5 patients improved to 6/12. 4 of them had a final outcome of 6/36 and 2 patients had a final outcome of 6/24. This denotes that timely intervention can result in good visual outcome.

DISCUSSION

A total of 50 patients in the age group 10 to 50 years with hyphema due to blunt ocular injury were enrolled and evaluated. In our study we found that there is an increased incidence of ocular trauma among the teenage group about 46% where as, greater than 40 years contributing to about 20% of the total population. In our study we found that the major mode of injury was due to sports equipments, injury by hand, cracker burst, assault and stationaries accounting to a total of 52% altogether. Stationaries, Games items, RTA are significantly higher in Males. In our study majority of the patients presented with a vision between 6/9 to 6/36 (82%). Very few patients presented with poorer vision like 6/60 or worser (18%)

Most of them presented with hyphema of Grades 1 to 3 accounting for about 94%. Very few patients presented with Grade 4 (6%). 44 patients (88%) did not have any associated traumatic mydriasis or sphincter tear, 6 patients had it associated with hyphema (2%) Most of the patients improved to 6/6 (50%) vision during follow up. About 42% of the patients had a follow up vision between 6/9 to 6/24. Very few patients had a follow up vision of 6/36 (8%).

LIMITATIONS

This study has certain limitations. Being a single-center study, the findings may have limited generalizability to the broader population. Additionally, a small proportion of patients were lost to follow-up during the study period, which may have influenced the assessment of long-term visual outcomes.

CONCLUSION

From the above study we come to a conclusion that most of the patients presenting with Hyphema due to blunt ocular injury affecting the anterior segment of the eye, if treated promptly and in time can regain better or normal vision. Protective measures should be taken to prevent blunt trauma to eye. We also found that patients presenting with mild grade of hyphema had a good visual prognosis.

Ethics approval and consent to participate

The present study was conducted in accordance with the ethical principles outlined in the *Declaration of Helsinki*. Prior approval was obtained from the Institutional Ethics Committee of PES Institute of Medical Sciences and Research, Kuppam, before the commencement of the study.

All participants were informed in detail about the nature, purpose, and procedures involved in the study. Written informed consent was obtained from each patient prior to enrollment. In cases involving participants below 18 years of age, consent was obtained from their parents or legal guardians.

Confidentiality of patient information was strictly maintained throughout the study. Participants were assured that their involvement was voluntary and that they could withdraw from the study at any stage without any impact on their treatment.

List of abbreviations

Abbreviation	Full Form
BCVA	Best Corrected Visual Acuity
logMAR	Logarithm of the Minimum Angle of Resolution
SD	Standard Deviation
RTA	Road Traffic Accident
PL+	Perception of Light Positive
IEC	Institutional Ethics Committee
VA	Visual Acuity
%	Percentage

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to ethical and privacy considerations, as they contain information that could compromise the confidentiality of research participants.

Conflicts of Interest

There is **no conflicts of interest** related to this study.

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This study was conducted using the resources and facilities available at PES Institute of Medical Sciences and Research, Kuppam. No external funding was received.

Authors' contributions

All authors contributed significantly to the conception, design, execution, analysis, and interpretation of the study.

Concept and study design: All authors

- **Dr. K Harshitha:** Data collection and clinical examination
- **Dr. M. Narayan:** Data analysis and interpretation
- **Dr. G. Hemeswari, Dr. Bollempalli Sri Sai Chaitra, Dr. Shaik Salma Begum, Dr. Rachana.D:** Statistical analysis
- **Dr. K Harshitha:** Manuscript drafting

Critical revision of the manuscript for important intellectual content: All authors

Final approval of the version to be published: All authors

Accountability for all aspects of the work: All authors

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