

Risk Factors and Outcome of Hyphema in Blunt Injury to Eye

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Abstract

Objectives: To study the causes, associated ocular findings and visual acuity on presentation, complications and visual outcome following treatment in patients of hyphema due to blunt injury.

Methods: A retrospective observational study was performed in 80 patients with hyphema due to blunt injury presenting to the outpatient and emergency department of the tertiary care centre of Gorakhpur, Uttar Pradesh for a period of 6 months. The gender, age, race, cause of blunt injury resulting in hyphema, eye involved, vision at admission, other associated ophthalmological findings, complications and visual outcomes were noted from the case records of patients. The data was analyzed using SPSS programme using the chi-square test.

Results: Males were more predominantly affected (88.75%). Half of the patients were aged below 30 years. Sports-related injury (51.25%) was the most common cause for hyphema. Hyphema disappeared within 5 days in 68.5% of patients. Iris injuries were very commonly associated in the form of mydriasis, iridodialysis. The best corrected vision of 6/18 or better was noted in 46.25% of patients at the last follow-up. The follow-up of these subjects was very poor and thus the incidence of secondary glaucoma could not be established. A significant association was seen between Best corrected visual acuity (BCVA) at presentation and at 6 weeks follow-up ($p < 0.05$).

Conclusion: Sports-related injury is the most common cause of hyphema. Good visual recovery, without serious complications, is possible with appropriate and in-time treatment in hyphema patients due to blunt injury.

Keywords: Blunt injury, Hyphema, Sports injury, BCVA.

INTRODUCTION

Hyphema is an accumulation of blood in the anterior chamber. It may occur secondary to trauma (ocular contusion or open globe injury) or surgery. It may also occur spontaneously as in rubeosis iridis, intraocular tumors (melanoma, retinoblastoma), and juvenile xanthogranuloma. It may also be associated with hemophilia, anticoagulation treatment, or the Valsalva maneuver.¹⁻⁵ Injury to the eye is one of the most common causes of unilateral blindness. Hyphema and associated injuries to ocular structures following blunt trauma frequently cause presentation to the emergency unit in many hospitals.⁵⁻¹⁰ The etiology of poor vision after blunt injury includes black ball hyphema, secondary glaucoma, cataract, vitreous hemorrhage, berlin's edema and retinal detachment.¹¹ Early recognition of factors related to poor visual outcome, timely appropriate medical therapy, surgical intervention when indicated and careful follow-up helps in preserving vision in such patients. The mechanism and source

of bleeding in cases of ocular contusion are from sudden distortion and displacement of intraocular structures. This results in the stretching of limbal tissues, a dynamic shift in aqueous, and the tearing of vessels of the peripheral iris and/or anterior ciliary body.

This study aims to determine the risk factors for blunt injury resulting in hyphema, clinical profile on presentation, and outcomes in these patients. This may help in the development of appropriate preventive measures to reduce the morbidity following blunt injuries of eye.

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MATERIAL AND METHODS

This is a retrospective observational study comprising of 80 patients with traumatic hyphema due to blunt injury presenting to the outpatient or emergency department of a tertiary hospital in Gorakhpur, Uttar Pradesh over a period of 6 months. A thorough history of all the subjects was taken, followed by visual acuity on the Snellen chart and anterior segment examination with slit-lamp biomicroscopy. Intraocular pressure (IOP) was measured with an applanation tonometer and a fundus examination was done after dilating pupil with 2.5% phenylephrine eye drops using 90D lens and slit-lamp.

Baseline characteristics of all the subjects like age, gender, race, type of blunt injury, vision at admission, other ocular findings, grading of hyphema, treatment given, time taken for absorption of hyphema, follow-up period, complications and best-corrected vision at last follow-up were documented in detail. Based on the level of blood in the anterior chamber (AC) at a slit-lamp examination, hyphema was graded as follows:

- Microscopic hyphema - when no clot was present (circulating red blood cells only),
- Grade I - blood filling < 1/3 of AC,
- Grade II - blood filling < 1/2 of AC,
- Grade III - blood filling more than 1/2 of AC,
- Grade IV - total hyphema with red or black clots.⁵

Gonioscopy was performed during the examination in first follow-up visit. The angle appearance was noted according to Shaffer classification from grade 0 to grade IV angle and abnormalities such as angle recession and peripheral anterior synechiae were also noted.

Inclusion Criteria

1. Patients between 10 and 70 years of age.
2. Patient having history of blunt ocular trauma.
3. Patients willing to give written informed consent.
4. Patients willing for follow-up.

Exclusion Criteria

1. Patients of age below 10 years or above 70 years.
2. Patients with postoperative hyphema, perforating injury with hyphema or hyphema due to any other cause except blunt ocular injury.
3. Patients who had undergone treatment elsewhere for the same.

Statistical Analysis

The data was documented meticulously. Nominal data was presented as numbers & percentage. The above data were tabulated and analyzed using Statistical Package for the Social Sciences SPSS programme (version 22). Comparison of the grade of hyphema with Best corrected visual acuity (BCVA) and BCVA at presentation with BCVA at 6 weeks follow-up was done using a chi-square test.

Observation and Result

Our study included 80 eyes of 80 patients. Right eye was affected in 53 (66.25%) subjects. This study showed a male 71

(88.75%) predominance. Sports injuries 41 (51.25%) were the most common cause of hyphema, the others being firecracker injuries 18 (22.50%), domestic injuries 12 (15.00%) and industrial injuries 9 (11.25%) in the decreasing order (Tables 1 and 2). The mean IOP at admission was 24.52 ± 16 . Echymosis was present in 27 patients and associated sub-conjunctival hemorrhage was seen in 32 patients. There was no fracture of orbital bones in any of the patients.

The most common grade of hyphema in our study was grade I seen in 25 (31.25%) patients, Grade II hyphema was seen in 21 (26.25%), Grade III in 18 (22.50%) and Grade IV in 16 (20%) (Table 3). Patients with grade III/IV hyphema had associated periorbital hematoma in 28 patients, iridodialysis in 4 patients, and traumatic mydriasis in 21 patients. All patients were treated as per the standard protocol. Surgical intervention was needed only in 3 elderly patients of grade IV hyphema (vision-only hand movements) in whom the IOP did not come down to normal level in spite of medical treatment.

21(26.25%) patients had BCVA between 6/6 to 6/18, 26(32.50%) patients had BCVA <6/18 to 6/60 and 33(41.25%) had BCVA <1/60 at time of presentation. At 6 weeks follow up 37 (46.25%) subjects had BCVA between 6/6 to 6/18, 22 (27.50%) patients had BCVA <6/18 to 6/60 and 21 (26.25%) had BCVA <1/60. There was a statistically significant association ($p= 0.024$) between BCVA at presentation and at 6 weeks of follow-up (Tables 4 and 5).

The IOP on discharge was 20 mmHg or below in 73 (91.25%) patients and between 21 to 30 mmHg in 7 (8.75%) patients. The time taken for absorption of hyphema ranged between 2 to 20 days; 55 (68.75%) patients had hyphema

Table 1: Age-wise distribution of the study population

Age (years)	Number of subjects(n)	Percentage (%)
10–20	8	10.00
21–30	32	40.00
31–40	24	30.00
41–50	11	13.75
51–60	3	3.75
61–70	2	2.50

Table 2: Distribution according to mode of injury

Mode of injury	Number of subjects(n)	Percentage (%)
Sports injury	41	51.25
Industrial injury	9	11.25
Domestic injury	12	15.00
Fire cracker injury	18	22.50

Table 3: Distribution according to the grading of hyphema

Grade	Number of patients (n)	Percentage (%)
I	25	31.25
II	21	26.25
III	18	22.50

Table 4: Distribution according to best corrected visual acuity (BCVA)

BCVA	At presentation	At 6 weeks follow up
6/6 to 6/18	21 (26.25%)	37 (46.25%)
<6/18 to 6/60	26 (32.50%)	22 (27.50%)
<6/60	33 (41.25%)	21 (26.25%)

p = 0.024 (< 0.05)

Table 5: Association of visual outcome with the grade of hyphema

Grade of hyphema	BCVA at 6 weeks follow up		
	6/6 to 6/18	<6/18 to 6/60	<6/60
I	15 (60.00%)	5 (20.00%)	5 (20.00%)
II	11 (52.38%)	5 (23.81%)	5 (23.81%)
III	6 (33.33%)	7 (38.89%)	5 (27.78%)
IV	5 (31.25%)	5 (31.25%)	6 (37.50%)

p = 0.496 (> 0.05)

absorbed within 5 days. No significant association observed between the grading of hyphema and the BCVA at 6 weeks follow-up (p-value = 0.496).

DISCUSSION

In our study, traumatic hyphema occurred most commonly in males under age 40 years, which concurs with other studies.^{6,8,11-14} Reduced VA on presentation was attributed to elevated IOP and associated injuries involving anterior and posterior segments such as cataracts, vitreous hemorrhage, and macular edema. Additional ocular injuries associated with trauma were zonular dehiscence, choroidal rupture, and macular scarring, all of which affected final visual prognosis.

In patients complicated by raised IOP during the course of management, control was achieved within 3 months in 91.25% with ocular hypotensive medications and surgical intervention was necessary in a small proportion. Trabeculectomy was indicated for 2 eyes, both of which presented with a grade IV hyphema secondary to impact by stone. The need for trabeculectomy was due to persistently high IOP.

Topical corticosteroids and cycloplegics were prescribed routinely to address the issues of anterior uveitis and ciliary muscle spasm associated with injury. These agents are important in preventing further complications such as posterior synechiae and pupil block glaucoma, and for analgesia (cycloplegia). Secondary hemorrhage (rebleeding) occurred in 4 cases (5%). A retrospective, comparative review of 154 patients by Shiuey and Lucarelli reported that hospitalization for hyphema does not appear to reduce the rate of rebleeding.¹⁵

A similar study of 43 patients by Williams et al.,¹⁶ with hyphema treated in outpatients, reported a rebleed rate of 6.9%; however, Rahmani et al.¹⁷ reported a rebleed rate of 18%, which was reduced with the use of oral tranexamic acid. Sjølie and Mortensen reported a retrospective study of 44 patients in Scandinavia with traumatic hyphema treated

as outpatients without antifibrinolytics and found a rebleed rate of 9.1% and VA of 20/30 or better in 98%.¹⁸

CONCLUSION

In conclusion, hyphema associated with ocular contusion is a recognized cause of significant visual disability and ocular morbidity. A total of 74% of eyes in our study had additional ocular injury and complications, with 37% of eyes having posterior segment trauma. Patients with posterior segment complications such as vitreous hemorrhage, commotio retina, macula hole, retinal detachment, chorioretinal scarring, and optic atrophy were likelier to have poorer visual outcomes.^{12,15}

Effective medical and surgical intervention may be necessary to preserve vision under selected circumstances. Visual prognosis also depends on the presenting VA, hyphema size, associated injuries, and complications. In our study, sports/games related injuries were the most common cause for hyphema (51.25%), of which shuttle cock injury during badminton game accounted for the majority of cases. The ocular injury in this game occurs commonly with round ended shuttle cock in the smash hit by the opponent player.

Wearing protective glasses during badminton game can prevent ocular injuries. The main treatment is bed rest and topical medical therapy to prevent iritis. Visual acuity and intraocular pressure are to be monitored daily during the hospitalization of the patient. Surgical evacuation of the blood has to be done when the IOP is 50 mm Hg for >5 days, or 30mmHg for >7 days in spite of maximal anti-glaucoma medications; when there is no sign of absorption of blood within 3-4 days after injury in patients with total hyphema and when there is impending blood staining of cornea.

The optimum duration of surgery is 5th to 7th day after injury for the following reasons: 1) if the IOP is normal, blood staining of cornea is unlikely to occur after 5th day of trauma; 2) too early attempts to remove the blood clot may in fact cause further bleeding because of manipulations in the anterior chamber, sudden lowering of IOP and dislodgement of clot; 3) surgery after 7 days of injury would be difficult due to firm adhesions and fibrosis; 4) new blood vessels and organization of clots occur within the first 5 days after trauma.

The best-corrected vision of 6/18 or better in 46.25% of patients in our study indicates the beneficial effect of appropriate and in-time treatment in patients of hyphema due to blunt trauma. Wearing protective glasses during shuttle badminton, squash games and at workplaces, supervision of children while playing, and dissemination of preventive methods of eye injuries through media and in the schools/colleges will help to reduce the ocular morbidity in young patients.

AUTHOR CONTRIBUTIONS

Dr. Ram Kumar- Defining structure of the study, Defining framework of study, drafting working proforma, collection

of data. Dr. Vanshika Khanna- Defining framework of study, drafting working proforma, collection of data, formulating observation tables, data analysis, writing of manuscript. Dr. Dipti Wahi- Defining framework of study, drafting working proforma, collection of data, formulating observation tables, data analysis, writing of the manuscript.

REFERENCES

- Morsman CD, Holmes J. Traumatic hyphaema in a haemophiliac. *Br J Ophthalmol* [Internet]. 1990;74(9):563. Available from: <http://dx.doi.org/10.1136/bjo.74.9.563>
- Recchia FM, Saluja RK, Hammel K, Jeffers JB. Outpatient management of traumatic microhyphema. None of the authors has any proprietary interest in the material presented herein. *Ophthalmology* [Internet]. 2002;109(8):1465–70. Available from: [http://dx.doi.org/10.1016/s0161-6420\(02\)01091-6](http://dx.doi.org/10.1016/s0161-6420(02)01091-6)
- Walton W, Von Hagen S, Grigorian R, Zarbin M. Management of traumatic hyphema. *Surv Ophthalmol* [Internet]. 2002;47(4):297–334. Available from: [http://dx.doi.org/10.1016/s0039-6257\(02\)00317-x](http://dx.doi.org/10.1016/s0039-6257(02)00317-x)
- Angunawela R, Huggkulstone CE. Uveitis–glaucoma–hyphema syndrome and systemic anticoagulation. *EYE* [Internet]. 2005;19(2):226–7. Available from: <http://dx.doi.org/10.1038/sj.eye.6701443>
- Sharma V, Vishwanath M. Spontaneous hyphaema following Valsalva-like manoeuvre. *EYE* [Internet]. 2009;23(5):1243–1243. Available from: <http://dx.doi.org/10.1038/eye.2008.150>
- Edwards WC, Layden WE. Traumatic hyphema. A report of 184 consecutive cases. *Am J Ophthalmol*. 1973;75(1):110–6.
- Yospaiboon Y, Sangveejit J, Suwanwatana C. Traumatic hyphema: clinical study of 149 cases. *J Med Assoc Thai*. 1989;72(9):520–6.
- Kearns P. Traumatic hyphaema: a retrospective study of 314 cases. *Br J Ophthalmol* [Internet]. 1991;75(3):137–41. Available from: <http://dx.doi.org/10.1136/bjo.75.3.137>
- Jan S, Khan S. Hyphema due to blunt trauma. *J Coll Physicians Surg Pak*. 2003;13(7):398–401.
- Amoni SS. Traumatic hyphaema in Kaduna, Nigeria. *Br J Ophthalmol* [Internet]. 1981;65(6):439–44. Available from: <http://dx.doi.org/10.1136/bjo.65.6.439>
- Ashaye AO. Traumatic Hyphaema: A report of 472 consecutive cases. *BMC Ophthalmol* [Internet]. 2008;8(1). Available from: <http://dx.doi.org/10.1186/1471-2415-8-24>
- Cho J, Jun BK, Lee YJ, Uhm KB. Factors associated with the poor final visual outcome after traumatic hyphema. *Korean J Ophthalmol* [Internet]. 1998;12(2):122. Available from: <http://dx.doi.org/10.3341/kjo.1998.12.2.122>
- Shiuey Y, Lucarelli MJ. Traumatic hyphema. *Ophthalmology* [Internet]. 1998;105(5):851–5. Available from: [http://dx.doi.org/10.1016/s0161-6420\(98\)95025-4](http://dx.doi.org/10.1016/s0161-6420(98)95025-4)
- Nasrullah A, Kerr NC. Sick cell trait as a risk factor for secondary hemorrhage in children with traumatic hyphema. *Am J Ophthalmol* [Internet]. 1997;123(6):783–90. Available from: [http://dx.doi.org/10.1016/s0002-9394\(14\)71127-4](http://dx.doi.org/10.1016/s0002-9394(14)71127-4)
- Ng CS, Sparrow JM, Strono NP, Rosenthal AR. Factors related to the final visual outcome of 425 patients with traumatic hyphaema. *EYE* [Internet]. 1992;6(3):305–7. Available from: <http://dx.doi.org/10.1038/eye.1992.60>
- Williams C, Laidlow A, Diamond A. Outpatient management of small hyphaemas (is it safe?). *Eye*. 1993;7.
- Rahmani B, Jahadi HR, Rajaeefard A. An analysis of risk for secondary hemorrhage in traumatic hyphema. *Ophthalmology* [Internet]. 1999;106(2):380–5. Available from: [http://dx.doi.org/10.1016/s0161-6420\(99\)90080-5](http://dx.doi.org/10.1016/s0161-6420(99)90080-5)
- SjølIE AK, Mortensen KK. Traumatic hyphaema treated ambulatory and without antifibrinolytic drugs. *Acta Ophthalmol* [Internet]. 2009;58(1):125–8. Available from: <http://dx.doi.org/10.1111/j.1755-3768.1980.tb04575.x>