

# Visual Outcomes of Hyphema in Closed Globe Injury, Managed at a Tertiary Care Institute

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## ABSTRACT

### BACKGROUND

An accumulation of blood in the anterior chamber is known as hyphema. An injury to the eye or its surrounding tissue, constitutes most of the calls for emergency in ophthalmology. This study aims to determine the causes and visual outcome following treatment in patients with hyphema following closed globe injury.

### METHODS

This is a prospective study involving 76 patients which done from February 2019 to September 2019 in the Department Of Ophthalmology. Detailed history was taken regarding the type, mode of injury, duration of injury and the eye affected. Lid and adnexal injuries, visual acuity at the time of admission were recorded. Detailed anterior segment evaluation on slit lamp was done. Appropriate treatment was given. The patients were followed after 1 week, and at the end of 6 weeks.

### RESULTS

Majority of patients were males (62 cases, 81%). The most common age group affected was 15-30 years i.e. 65 patients (85%). Sports related injury (32 cases, 42%) was most common cause of hyphema followed by road traffic accident (20 cases, 26%). Of the 76 patients, iris injuries were very common (35 cases). Other ocular findings included- ecchymosis, subconjunctival haemorrhage and angle recession. Moderate blood staining of cornea occurred in 3 patients. The most common form of hyphema in our study was grade-1 seen in 42 patients (55%). Anterior chamber wash done in 10 patients. Rest of the patients were observed carefully. The best corrected vision of 6/24 or better was noted in 68 patients (89%) at the last follow up.

### CONCLUSIONS

Hyphema occurring as a result of blunt trauma, though alarming is also an easily manageable condition if necessary intervention is done early and adequately. Blunt trauma can be prevented by supervising during play or use of adequate protection at work. Early initial presentation for early diagnosis and treatment can help to prevent many ocular complications and better visual outcome after trauma.

### KEYWORDS

Ocular Trauma, Hyphema, Visual Acuity

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## BACKGROUND

Eye injuries are a major and under-recognized cause of disabling morbidity. The public health importance of ocular trauma is undeniable. An injury to the eye or its surrounding tissues, constitute most of the calls for emergency in Ophthalmology. The trauma may range from simple superficial injuries to devastating penetrating injuries of the globe. The surgical management of such injuries is directed at the restoration of normal ocular anatomy and function. The ultimate goal being prevention of secondary complications and maximizing the patient's visual prognosis. Dramatic improvements in the surgical management of ocular trauma have evolved over the past two decades. However, persistent inadequacy in the standardized documentation of eye injury morbidity and treatment outcome, limits the development and widespread introduction of techniques for preventing and improving the prognosis of serious eye trauma.

### Traumatic Hyphema

An accumulation of blood in the anterior chamber is known as hyphema. Trauma producing bleeding into the anterior chamber of the eye is common. Hyphaema can be primary, secondary and recurrent.

### Primary Hyphema

It occurs at the time of the injury. The bleeding is self-limiting, irrespective of whether it occurs from a small vessel or a large vessel. This is because, equilibrium is maintained between the vascular and the intraocular pressure and once a vessel of the iris ruptures, there is immediate contraction of its wall. If the haemorrhage is large, it suggests rupture of larger vessel near the root of the iris or, ciliary body

### Secondary Hyphema

The haemorrhage occurs on the 2<sup>nd</sup> to 5<sup>th</sup> day, when there is clot lysis and retraction. Incidence of secondary haemorrhage is variable: 5% to 30%.<sup>1</sup> It is more common when the amount of blood initially is large.<sup>2</sup>

### Recurrent Hyphema

Rarely, haemorrhage into the anterior chamber recurs for weeks or months. Recurrent hyphema following a blunt injury to the eye may at times be associated with a poorer prognosis than occurring from the initial trauma. The presence of fresh blood in the anterior chamber, or an increase in the amount of blood in the anterior chamber is considered indicative of a recurrent bleeding. The risk factors and the exact mechanism is not known. It is hypothesized, that, once the initial vasospasm is relieved or after fibrinolysis occurs, the platelets can no longer adhere to the vessel wall or cannot aggregate. The initial clot which is formed is expressed into the low – resistance anterior chamber producing further haemorrhage.<sup>3</sup> The reported incidence of secondary anterior chamber hemorrhage, that is, rebleeding, in the setting of traumatic hyphema ranges from 0% to 38%.<sup>4</sup>

### Associated Ocular Findings

Angle recession, a separation between the longitudinal and circular muscle fibres of the ciliary muscle,<sup>5</sup> is the most important associated anterior segment finding in traumatic hyphema. The amount of angle recession does not necessarily correlate with the size of the hyphema or degree of acute IOP elevation. The incidence of angle recession is variably reported as 30% to 85%.<sup>6,7,8</sup> More extensive recession is associated with a higher incidence of late onset glaucoma, and it is estimated that approximately 6% to 10% of hyphema patients will develop angle recession glaucoma.<sup>9</sup> Traumatic iritis invariably accompanies hyphema. Pigment liberation may result in endothelial pigment dusting and increase the trabecular meshwork pigmentation. Iris atrophy and a Vossius ring, signifying compression of the pupillary margin on the anterior lens capsule, may be seen.

### Guidelines for Surgical Intervention in Traumatic Hyphema<sup>10</sup>

To prevent optic atrophy

- Operate before IOP averages > 50 mmHg for 5 days.
- Operate before IOP averages > 35 mmHg for 7 days.

To prevent corneal blood staining

- Operate before IOP averages >25 mmHg for 6 days
- Operate if there is any indication of early blood staining

To prevent peripheral anterior synechiae

- Operate before a total hyphaema persists for 5 days.
- Operate before a diffuse hyphaema involving most of the anterior chamber angle persists for 9 days.

In hyphaema patients with sickle cell haemoglobinopathies

- Operate if IOP averages  $\geq$ 25 mmHg for 24 hours
- Operate if IOP has repeated transient elevations > 30 mmHg.

### Complications

- Higher risk of secondary glaucoma- Secondary glaucoma can present acutely, or late in life even decades after an isolated injury. Outflow obstruction due to trabeculitis, clogging of trabecular meshwork by inflammatory cells & RBCs, break down products, mechanical occlusion of pupil by hyphema/clot.
- Corneal blood staining- Total hyphema is associated with sudden visual loss, high IOP, extreme pain, nausea. If hyphema persists longer, there is a risk of damage to the trabecular meshwork, uveitis & possible re-bleed.<sup>11</sup> In the study by Coles, the risk of elevated IOP was high for those whose hyphemas filling more than 50% of the anterior chamber, or a grade III hyphema.<sup>12</sup>

Management of such cases varies according to severity. Uncomplicated/mild bleed are treated conservatively, with head elevation and rest. Patients with bleeding diathesis, re-bleed, corneal staining, extreme IOP elevation will require energetic management. Medical management is done with IOP lowering drugs such as topical aqueous suppressants, beta-blockers and alpha agonists. Systemic carbonic anhydrase inhibitor like acetazolamide and hyperosmotic

agent i.e. mannitol may be required if pressure doesn't decrease with topical management. Cycloplegics, steroids may be required to control pain and inflammation. Tranexamic acid may be given to prevent rebleed. Approximately 5 percent of patients with traumatic hyphema require surgery.<sup>13</sup>

### Options in Surgical Management

Anterior chamber irrigation and aspiration i.e. anterior chamber washout, hyphema evacuation using vitrectomy instrumentation Clot irrigation with a filtering procedure trabeculectomy when high IOP poses a risk. Anterior chamber paracentesis. Peripheral iridectomy, if pupillary block occurs due to total hyphema.<sup>14</sup>

## METHODS

This is a prospective study involving total of 76 patients conducted from February 2019 to September 2019 in the Department of Ophthalmology. Out of 102 patients 88 were males and 14 females. Detailed history was taken regarding the type and mode of injury, duration of injury, the eye affected, other lid and adnexal injuries were noted, visual acuity at the time of admission recorded, detailed anterior segment evaluation in slit lamp was done.

Hyphaema was graded as follows- (height as measured in millimeters from the inferior limbus)- **Grade-0**- No visible layering, but red blood cells within the anterior chamber. **Grade-1**- Layered blood occupying less than 1/3<sup>rd</sup> of anterior chamber. **Grade-2**- Layered blood filling 1/3<sup>rd</sup> to 1/2 of anterior chamber. **Grade-3**- Layered blood filling 1/2 to total of anterior chamber. **Grade-4**- Total filling of anterior chamber with blood.

The colour of the blood is noted from which time since injury can be framed. Clotted blood appears darker in appearance. If anterior chamber is completely filled with bright red blood it is called total hyphema. If filled with dark red-black blood in both anterior and posterior chambers including the pupil its called 8-ball hyphema. Intraocular pressure recording by Goldmann applanation tonometer, fundus and 90 D evaluation was then done wherever feasible. Those patients in whom posterior segment was not visualized B-scan was done to rule out any posterior segment pathology. History of any systemic diseases like anaemia, liver or kidney disease, blood dyscrasias, use of thrombolytics or anticoagulants was inquired.

### Inclusion Criteria

- Age group-15-50 years.
- Blunt trauma with closed globe injury.
- Those who gave consent.

### Exclusion Criteria

- Postoperative intraocular surgery.
- Open globe injury, any active infection.
- Diagnosed case of neovascularisation of iris and angle.

- Any posterior segment pathology, neoplasia of ocular tissues.
- Vascular anomaly or any bleeding diathesis.
- Patients on anti-coagulants and anti-platelets therapy.

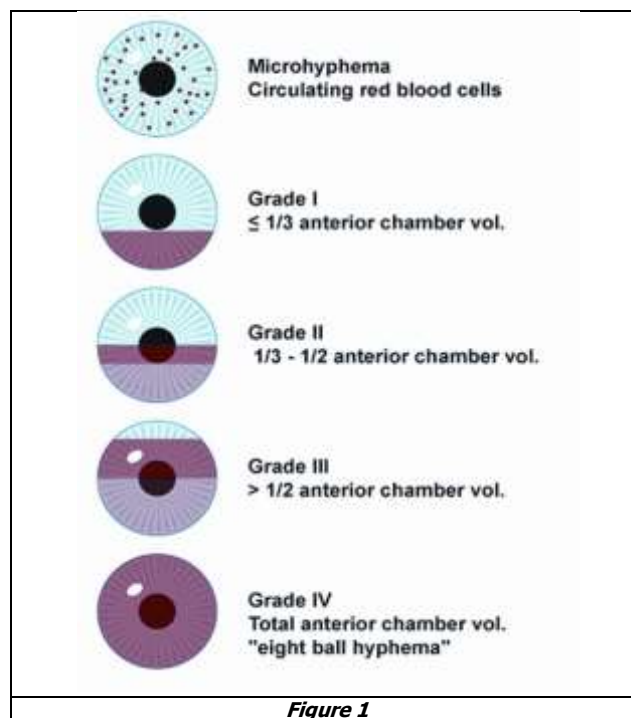


Figure 1

All these patients were managed conservatively with restriction of physical activities, complete bed rest with head end elevated to 45° and patching of affected eye with rigid eye shield. This was followed by medical treatment in form of topical anti-glaucoma drug e/d timolol maleate 0.5% twice daily, topical cycloplegic e/d homatropine 2% twice daily, steroid e/d Prednisolone acetate 1 drop 4 times per day. Eyes with IOP >21 mmHg were put on Tab Acetazolamide (250) mg thrice daily along with e/d Timolol. Following treatment for 7 days Visual acuity, Grade of hyphema and IOP was evaluated on the 8<sup>th</sup> day.

## RESULTS

Out of 76 patients, majority were males, (62 cases, 81%). The most common aged group affected was between 15-30 yrs. (65 cases, 85%). Sports related injury was the most common cause of hyphema (32 cases, 42%) followed by road traffic accident (20 cases, 26%). Other modes of injury comprised of Industrial (12 cases, 15%), home (8 cases, 10%) and physical assault (4 cases, 5%).

Among the 76 patients, 35 patients had involvement of iris which was very common. Out of 35 cases, 18 cases had iridodialysis, 10 cases had sphincter tear and 7 cases had iris hole. Other ocular finding included ecchymosis, subconjunctival haemorrhage, and angle recession. Moderate blood staining of cornea was seen in 3 cases.

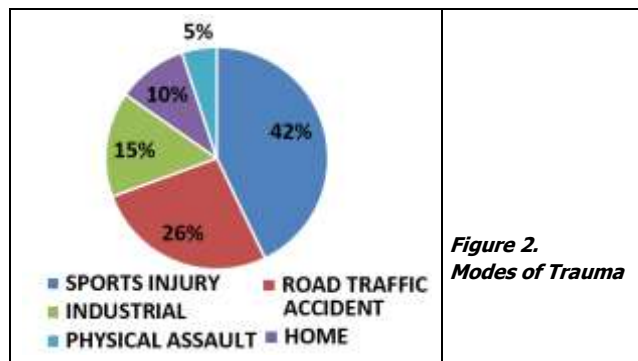


Figure 2. Modes of Trauma

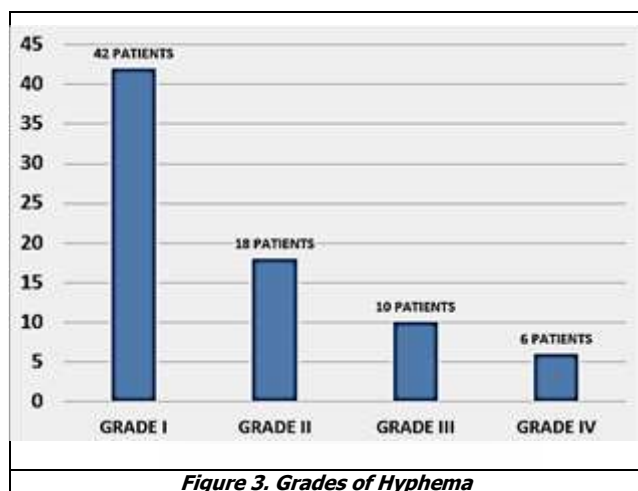


Figure 3. Grades of Hyphema

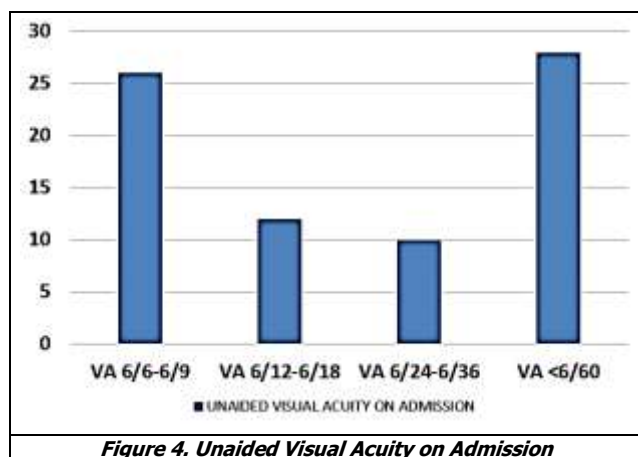


Figure 4. Unaided Visual Acuity on Admission

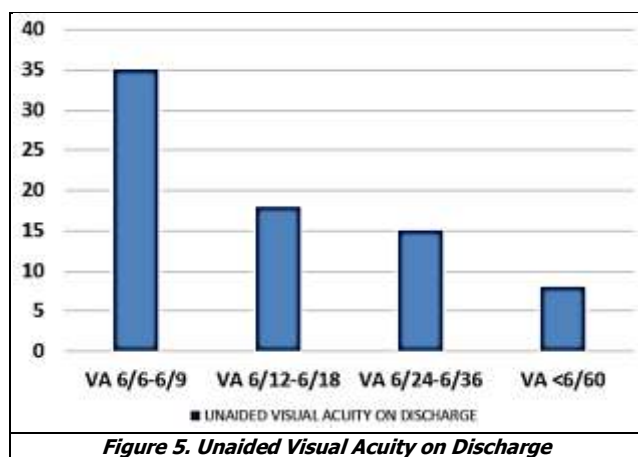


Figure 5. Unaided Visual Acuity on Discharge

In our study, Grade-1 hyphema was seen in 42 cases (55%) (most common) Grade-2 hyphema was seen in 18

cases (23%), Grade-3 hyphema was seen in 10 cases (13%), and Grade-4 hyphema seen in 6 cases (7%).

Regarding the IOP of the patients at the time of admission- 58 cases had a normal IOP (10-21 mmHg). 12 cases had an elevated IOP >21 mmHg due to large hyphema >1/2 anterior chamber. 7 cases had (IOP <11 mmHg). On discharge number of patients with normal IOP was 63 as against 58 at the time of admission. No. of patients with elevated IOP decreased from 12 to 3 cases. With the absorption of hyphema patients who had slightly below normal IOP showed significant improvement. Gonioscopy was performed in 60 cases out of 76. In remaining 16, gonioscopy could not be done due to presence of grade-3 grade-4 hyphema. Out of 60 cases, 52 cases had normal anterior chamber angle, 5 cases had angle recession and 3 cases had blood in anterior chamber angle. Regarding the management of patients grade-1, 2 and five cases of grade 3 hyphema patients were managed medically and rest of patients rest 5 cases of grade 3 and grade 4 hyphema patients were managed surgically by anterior chamber wash.

Every patient was thereafter managed carefully. On admission unaided visual acuity (UVA) ranged from 6/6 to no light perception 26 patients (34%) had a normal or near normal UVA (6/6-6/9). 12 patients (15%) had a mild reduction in the UVA (6/12-6/18). 10 patients had a moderate reduction in the UVA (6/24-6/36). And 28 (36%) patients had a severe reduction in the UVA (≤6/60).

On discharge, 35 (45%) patients had normal or near normal UVA (6/6-6/9). 18(26%) patients had a mild reduction in the UVA (6/12-6/18). 15 (19%) had a moderate reduction in the UVA (6/24-6/36). 8 (10%) had a severe reduction in the UVA (≤6/60). The best corrected visual acuity of 6/24 or better was noted in 68 (89%) at the last follow up.

**DISCUSSION**

In this study higher frequency of hyphema in males is due to more number of males participating in sports, working in different industries with involvement in assaults and accidents In the study done by Ulagantheran et al in the year 2010 Malaysia the male to female ratio was found to be (2.5:1) as against 4.1: 4 in our study.<sup>15</sup> Higher ratio was reported from a study done in South Korea (8:1) by Cho J et al<sup>16</sup> In our study 85% patients were young (15-30) however similar age presentation was reported to be much higher in patients from Nigeria (96%), a study done by Amoni SS et al.<sup>17</sup> Sports related injury reported in our study was 42% and is similar to that reported from Nigeria (42%),<sup>17</sup> however much higher frequency of this ratio in studies done in UK (49.2%)<sup>18</sup> and Pakistan(66.6%).<sup>19</sup>

Hyphema due to domestic causes, injury at home was 10% in our study, while the same was higher in studies done (13.5%) in Malaysia<sup>15</sup> and UK (17.8%),<sup>18</sup> and lower (7.9%) in Nigeria.<sup>17</sup> Hyphema due to physical assault was 5% of patients in our study, while same was higher (in 20.7% of patients) in UK by Kearns et al.<sup>18</sup> RTA resulted in hyphema

in 26% of cases in our study while the same was lower (1.6%) of cases by Cho et al.<sup>16</sup> In our study grade 2 hyphema was 23%, which was lower than that in Nigeria<sup>17</sup> and Pakistan,<sup>19</sup> which reported 50% of the patients to have a grade 2 hyphema. In our study on discharge the final visual outcome of the patients was relatively good ( $>6/60$ ) in 90% of our patients, but poor ( $\leq 6/60$ ) in 10%. However, VA of  $>6/18$  or better achieved in 75% of patients in a study reported by Kearns et al.<sup>18</sup>

### CONCLUSIONS

Hyphema occurring as a result of blunt trauma, though alarming is also an easily manageable condition if necessary intervention is done early and adequately. Blunt trauma can be prevented by supervising during play or use of any protection at work. In our study, most of the patients with grade 1 hyphema, were managed either conservatively or medically. Visual outcome of grade 1 hyphema was found to be better than grade 2 hyphema at the time of discharge. The prognosis of visual outcome depends on the grade of hyphema. Proper patient instruction, early diagnosis and treatment can prevent secondary bleeding.

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