

## A DESCRIPTIVE STUDY OF CLOSED GLOBE INJURIES WITH HYPHAEMA

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### ABSTRACT

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#### BACKGROUND

Eye injuries still remain one of the most common causes of unilateral blindness worldwide. In addition to the physical and psychological trauma to the patient, the direct and indirect costs to the society are enormous. Blunt eye injuries commonly result in traumatic hyphaema and are not an infrequent cause of presentation to the emergency units of many eye clinics.

Aims of this study were-

1. To study the cause, clinical presentation, complications and visual outcome of closed globe injury with hyphaema.
2. To know the association between mode of injuries and associated lesions and visual outcome.

#### MATERIALS AND METHODS

Study Design and Statistical Analysis- A descriptive case series study was conducted at Regional Institute of Ophthalmology, Thiruvananthapuram for a period of one year, from October 2010 to September 2011, in all patients coming to the institute with hyphaema due to closed globe injury and willing to participate in the study. Patients with pre-existing ocular diseases were excluded. Data were analysed using computer software, Statistical Package for Social Sciences (SPSS) version 10. Data are expressed in its frequency and percentage. To elucidate the associations and comparisons between different parameters, Chi square ( $\chi^2$ ) test was used as a nonparametric test. For all statistical evaluations, a two-tailed probability of value, < 0.05 was considered significant.

#### RESULTS

Sixty patients who completed the 6-month followup were taken for the analysis. 31.7% were between the age group of 10-19 years and 80% were male. Play and sports injury constituted 35% and work site injuries constituted about 21.7% of the total injuries. 60% had only grade 1 hyphaema and 43.3% had angle recession. Those who had initial VA >6/60 either maintained that vision or improved. Only 10% of the study population had corneal blood staining. Majority of those who had initial hyphaema <1/3<sup>rd</sup>, had normal initial intraocular pressure. Of the total 36 patients who had initial hyphaema less than 1/3<sup>rd</sup>, 29 (80.6%) had normal intraocular pressure on presentation. Of the 36 patients with initial hyphaema <1/3<sup>rd</sup>, 28 (77.8%) had normal intraocular pressure at 3<sup>rd</sup> day. Those who had lenticular and posterior segment injury had poor visual outcome. In our study, initially only 15% had vision better than 6/12, but at the end of 180 days of followup, 81.7% had vision better than 6/12. At initial presentation, only 66.7% had normal intraocular pressure but at the end of 180 days of followup, 100% of the study population had normal intraocular pressure. So, even though the initial vision and intraocular pressure were not favourable, majority improved over 6 months with treatment and close followup.

#### CONCLUSION

In this study, males and school going children in the age group of 10-20 were the major group. Work site injuries and play and sports injuries were associated with significant ocular morbidity. Majority of the patients had grade 1 hyphaema on initial presentation, and most of these patients had normal intraocular pressure on presentation and better final visual outcome. Corneal blood staining was found to be significantly associated with grade of hyphaema. Those who had total and near total hyphaema were at increased risk for corneal blood staining and they had poor final visual outcome. Although angle recession was common, significant angle recession was less. There was no significant correlation between angle recession and final visual outcome. In this study, those who had initial good vision and normal intraocular pressure either maintained the condition or improved. Poor final visual outcome was significantly associated with lenticular and posterior segment injuries.

#### KEYWORDS

Closed Globe Injury, Hyphaema, Angle Recession, Corneal Blood Staining, Visual Outcome.

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#### BACKGROUND

Ocular trauma is a major cause of worldwide visual impairment. The eyes are the third most common organs affected by injuries, next to the hands and feet,<sup>1</sup> despite the fact that they represent only 0.27% of the total body area and 4% of the facial area. Eye injuries still remain one of the most common causes of unilateral blindness worldwide.

Their significance to individual and society is enormous. In addition to the physical and psychological trauma to the patient, the direct and indirect costs to the society are enormous.

Many of these injuries occur during sports and from work sites.<sup>2,3</sup> House hold injuries<sup>4</sup> and road traffic injuries are also not infrequent. Traumatic hyphaema on its own is well

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recognised as a serious and often vision-threatening sequel of blunt eye trauma. Blunt eye injuries mostly result in traumatic hyphaema and are not an infrequent cause of presentation to the emergency units of many eye clinics.<sup>5,6,2,7,3,8</sup> Hyphaema may occur in isolation or more often with damage to other structures within the eye. Eyes with poor visual outcome were found to have such associated injuries.

The grade of injury, complications and visual outcome mainly depends on the mode of injury and force of injury. Majority of these injuries can be prevented by proper protective eyewear. All industries where workers are at risk of ocular injuries should be given proper education regarding protection and first aid, and should be provided with protective eyewear.

**Aims and Objectives**

This study primarily aims to evaluate the cause, clinical presentation, complications and visual outcome of closed globe injury with hyphaema. A secondary objective was to evaluate the association between mode of injuries and associated lesions and visual outcome.

**MATERIALS AND METHODS**

Descriptive case series study was conducted at Regional Institute of Ophthalmology, Thiruvananthapuram for a period of one year from October 2010 to September 2011 in all patients coming to the institute with hyphaema due to closed globe injury and willing to participate in the study. Patients with pre-existing ocular diseases and patients not willing to participate in the study were excluded. Institutional Review Board Ethics Committee approval was obtained for this study, and it was carried out in adherence to the tenets of the Declaration of Helsinki.

All the patients satisfying the inclusion and exclusion criteria were included in the study. 60 patients who completed the study were taken for analysis. At the time of admission, a detailed history was taken including medical and ocular diseases in the past according to the proforma.

A detailed examination recording the initial best corrected visual acuity by Snellen’s chart, slit lamp examination and intraocular pressure recording and indirect ophthalmoscopy for fundus examination were done for all patients.

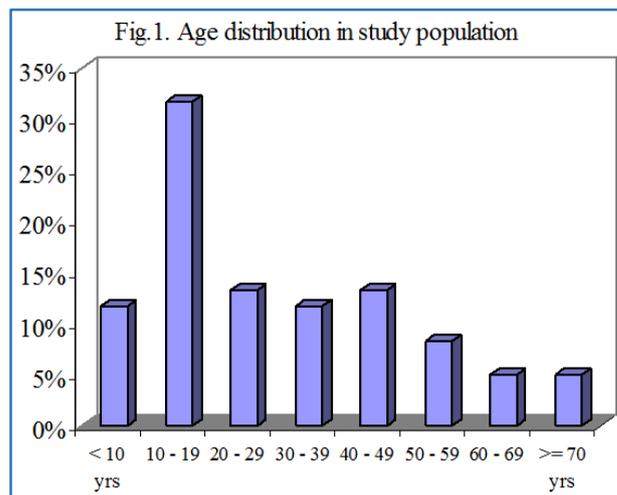
These patients were followed up on the 3<sup>rd</sup> day, 7<sup>th</sup>, 30<sup>th</sup>, 90<sup>th</sup> and 180<sup>th</sup> day. During followup they were specifically evaluated for best corrected visual acuity, intraocular pressure, slit lamp examination for corneal blood staining, lenticular injuries, and indirect ophthalmoscopy for posterior

segment pathologies. Gonioscopy was done either at 7<sup>th</sup> day or 1<sup>st</sup> month according to the clinical condition and resolution of hyphaema, to see for widening of ciliary body band, trabecular pigmentation and scarring which were taken as simple evidence for angle recession.

**Statistical Analysis**

Data were analysed using computer software, Statistical Package for Social Sciences (SPSS) version 10. Data are expressed in its frequency and percentage. To elucidate the associations and comparisons between different parameters, Chi square ( $\chi^2$ ) test was used as a nonparametric test. For all statistical evaluations, a two-tailed probability of value, < 0.05 was considered significant.

**RESULTS**



Majority (31.7%) of the study population was between the age group of 10-19 years.

Majority of the injury sustained were males 80% (48 patients) and only 20% (12 patients) were female. (Figure 1).

In mode of injury, play and sports injury constituted 35% (21 patients) of the total injuries. Work site injuries constituted about 21.7% (13 patients), Road traffic accidents 5% (3 patients) and others 38.3% (23 patients).

60% of the study population had only grade 1 hyphaema on presentation and 16.7% had microscopic hyphaema. (Table 1).

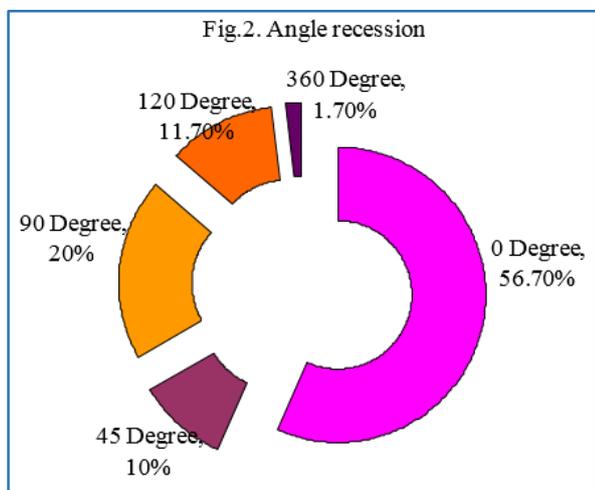
Hyphaema	Frequency	Percent
Microscopic	10	16.7
< 1/3	36	60.0
1/3 to Half	4	6.7
Half to Near Total	5	8.3
Total	5	8.3
<b>Total</b>	<b>60</b>	<b>100</b>

**Table 1**

Only 10% (6 out of 60 cases) of the study population had corneal blood staining.

11.7% (7 out of 60 cases) had associated lenticular injury and 23.3% (14 out of 60 cases) had associated posterior segment injuries.

Total 43.3% (26 cases) had angle recession, but only 1 patient had angle recession more than 180 degrees. (Figure 2).



Only 19.3% (11 cases) required surgical intervention, of these 11.7% (7 out of 60 cases) for associated injuries, 1.7% (1 out of 60 cases) for glaucoma and 5% (3 out of 60 cases) for hyphaema.

Visual Acuity 1	Visual Acuity at 180 <sup>th</sup> Day		Total
	>= 6/12	6/18 to 6/60	
>= 6/12	9		9
	18.40%		15.00%
6/18 to 6/60	24	1	25
	49.00%	9.10%	41.70%
6/60 to 1/60	5	2	7
	10.20%	18.20%	11.70%
1/60 to PL	11	8	19
	22.40%	72.70%	31.70%
<b>Total</b>	<b>49</b>	<b>11</b>	<b>60</b>
P > 0.05			
<b>Table 2</b>			

Those who had initial VA >6/60 either maintained that vision or improved, whereas those who had initial vision <6/60, the percentage of those improved were less, but this was not statistically significant p>0.05 (Table 2).

IOP 1	Visual Acuity at 180 <sup>th</sup> Day		Total
	>= 6/12	6/18 to 6/60	
Low IOP (<10)	2		2
	4.10%		3.30%
Normal (10-21)	36	4	40
	73.50%	36.40%	66.70%
High (>21)	11	7	18
	22.40%	63.60%	30.00%
<b>Total</b>	<b>49</b>	<b>11</b>	<b>60</b>
P < 0.01			
<b>Table 3</b>			

Those who had initial normal intraocular pressure had better (>6/12) final visual outcome. 73.5% of those with final vision better than 6/12 had initial normal intraocular pressure (Table 3).

Grade of Hyphaema	Visual Acuity at 180 <sup>th</sup> Day		Total
	>= 6/12	6/18 to 6/60	
Microscopic	8	2	10
	16.30%	18.20%	16.70%
< 1/3	32	4	36
	65.30%	36.40%	60.00%
1/3 to Half	1	3	4
	2.00%	27.30%	6.70%
Half to Near	5		5
	10.20%		8.30%
<b>Total</b>	3	2	5
	6.10%	18.20%	8.30%
<b>Total</b>	<b>49</b>	<b>11</b>	<b>60</b>
P<0.05			
<b>Table 4</b>			

Those who had initial hyphaema <1/3<sup>rd</sup> of anterior chamber had better final visual outcome. Of the 49 patients who had final vision >6/12, 65.3% had initial hyphaema <1/3<sup>rd</sup> of anterior chamber. (Table 4).

Those who did not have corneal blood staining had better final visual outcome. Of the 49 patients who had final vision >6/12, only 3 (6.10%) had corneal blood staining. Out of the total 6 patients with corneal blood staining, 3 had final vision >6/12. P value is <0.05.

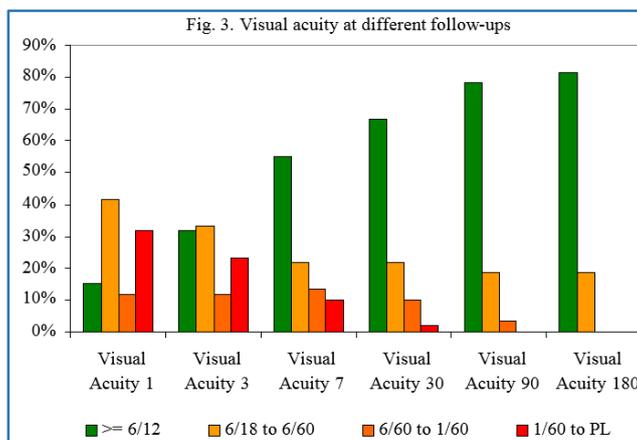
Those who had lenticular injury had poor visual outcome. Of the 49 patients who had visual acuity >6/12 at 6 months, 47 (95.9%) had no lenticular injury. Of the 7 patients who had lenticular injury, only 2 improved to vision >6/12. P value is <0.001.

Those who had associated posterior segment injury had poor visual outcome. Of the 49 patients who had final vision >6/12, 44 (89.8%) patients did not have any posterior segment injury. Of the total 14 patients who had posterior segment injury, only 5 improved to vision better than 6/12. P value is <0.001.

Majority of those who had initial hyphaema <1/3<sup>rd</sup>, had normal initial intraocular pressure. Of the total 36 patients who had initial hyphaema less than 1/3<sup>rd</sup>, 29 (80.6%) had normal intraocular pressure on presentation. P value is <0.05

Of the total 6 patients who had corneal blood staining, 5 patients had total hyphaema. All the 5 patients (100%) with total hyphaema had corneal blood staining. P value is <0.001

Of the total 7 patients who had lenticular injury, 4 had hyphaema less than 1/3<sup>rd</sup>. It is not statistically significant, P > 0.05.



	Grade of Hyphaema					Total
	Microscopic	< 1/3	1/3 to Half	Half to Near Total	Total	
0 Degree	6 60.00%	23 63.90%	3 75.00%		2 40.00%	34 56.70%
45 Degree		5 13.90%		1 20.00%		6 10.00%
90 Degree	4 40.00%	4 11.10%		2 40.00%	2 40.00%	12 20.00%
120 Degree		3 8.30%	1 25.00%	2 40.00%	1 20.00%	7 11.70%
360 Degree		1 2.80%				1 1.70%
<b>Total</b>	<b>10</b>	<b>36</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>60</b>
P > 0.05						
<b>Table 5</b>						

No statistically significant correlation between grade of hyphaema and angle recession (Table 5).

Figure 3- From the initial 15% who had vision better than 6/12, at end of 180 days of followup 81.7% had vision better than 6/12 (figure 3).

At initial presentation, only 66.7% had normal intraocular pressure, but at the end of 180 days of followup 100% of the study population had normal intraocular pressure.

**DISCUSSION**

In this study undertaken by us, initially 65 patients were enrolled, of which 60 patients who completed the 6-month followup were taken for the analysis.

In this study group, majority (31.7%) of the patients were between the age group of 10-19 years that is the school going group. Majority of the injured were male (80%) and only 20% were female. The results are similar to the results of the study "Traumatic Hyphaema: A report of 472 consecutive cases" done at Department of Ophthalmology, University College Hospital, Ibadan, Nigeria, which concluded that the majority of patients were male. Children and young adults aged ≤ 20 years comprised 63.6% of patients.<sup>9</sup>

81% of patients were male and 19% female in a study "Traumatic hyphaema caused by eye injuries" conducted at the Department of Ophthalmology, Medical University Gdansk.<sup>2</sup>

Male preponderance and high prevalence of patients younger than 15 years were noted in a study "Traumatic hyphaema clinical study of 149 cases" conducted by Yospaiboon y et al 1989.<sup>10</sup>

Play and sports injury constituted 35% of the total injuries. Work site injuries constituted about 21.7%. The study "Traumatic Hyphaema: A report of 472 consecutive cases" done at Department of Ophthalmology, University College Hospital, Ibadan, Nigeria also reported activities at the time of injury were games (play) in 39% of cases.<sup>9</sup>

60% of the study population had only grade 1 hyphaema on presentation and 16.7% had microscopic hyphaema at presentation. This is similar to the study done by Arif Y, Balatay and Haval R Ibrahim.<sup>11</sup> The results were; at the time of presentation 24 patients (60%) had grade 1 hyphaema, 9 patients (22.5%) with grade 2, 5 patients (12.5%) with grade 3 and 2 patients (5%) with grade 4.

Total 43.3% had angle recession, but only 1 patient had angle recession more than 180 degree. And during 6 months followup, only one patient developed angle recession glaucoma and underwent surgery.

Those who had initial VA >6/60 either maintained that vision or improved. Whereas those who had initial vision of <6/60 the percentage who improved were less, but this was not statistically significant  $p > 0.05$ .

Only 10% of the study population had corneal blood staining. Those who did not have corneal blood staining, had better final visual outcome. Of the 49 patients who had final vision >6/12, only 3 (6.10%) had corneal blood staining. Out of the total 6 patients with corneal blood staining, 3 had final vision >6/12. Of the total 6 patients who had corneal blood staining, 5 patients had total hyphaema. All the 5 patients (100%) with total hyphaema had corneal blood staining. This was statistically significant with  $p$  value <0.05. The result was similar to the study done by J D Brodrick et al.<sup>12</sup>

Majority of those who had initial hyphaema <1/3<sup>rd</sup>, had normal initial intraocular pressure. Of the total 36 patients who had initial hyphaema less than 1/3<sup>rd</sup>, 29 (80.6%) had normal intraocular pressure on presentation. Of the 36 patients with initial hyphaema <1/3<sup>rd</sup>, 28 (77.8%) had normal intraocular pressure at 3<sup>rd</sup> day. Both these findings were significant with  $p$  value <0.05.

Those who had lenticular and posterior segment injury had poor visual outcome. Of the 49 patients who had visual acuity >6/12 at 6 months, 47 (95.9%) had no lenticular injury. Of the 7 patients who had lenticular injury only 2 improved to vision > 6/12. Of the 49 patients who had final vision >6/12, 44 (89.8%) patients did not have any posterior segment injury. Of the total 14 patients who had posterior segment injury only 5 improved to vision better than 6/12. The association between poor visual outcome and associated lenticular and posterior segment injury was significant with  $p$  value <0.05. The results were similar to a study done by Jaeseo Cho et al at Department of Ophthalmology, Hanyang University, Seoul, Korea.<sup>13</sup>

No statistically significant correlation between grade of hyphaema and angle recession could be found because  $P$  value was more than 0.05. This result is similar to the study conducted by Song JY, Oum BS et al, Department of Ophthalmology, College of Medicine, Pusan National University, Pusan, Korea.<sup>14</sup>

In this study, initially only 15% had vision better than 6/12, but at the end of 180 days of followup 81.7% had vision better than 6/12. At initial presentation, only 66.7% had normal intraocular pressure, but at the end of 180 days of followup 100% of the study population had normal intraocular pressure. So, even though the initial vision and intraocular pressure were not favourable, majority improved over 6 months with treatment and close followup.

## CONCLUSION

In this study, males and school going children in the age group of 10-20 were the major group. Work site injuries and play and sports injuries were associated with significant ocular morbidity.

Majority of the patients had grade 1 hyphaema on initial presentation, and most of these patients had normal

intraocular pressure on presentation and better final visual outcome.

Corneal blood staining was found to be significantly associated with grade of hyphaema. Those who had total and near total hyphaema were at increased risk for corneal blood staining and they had poor final visual outcome.

Although angle recession was common, significant angle recession was less. There was no significant correlation between angle recession and final visual outcome.

In this study, those who had initial good vision and normal intraocular pressure either maintained the condition or improved. Poor final visual outcome was significantly associated with lenticular and posterior segment injuries.

## Limitations

The main limitation of this study is regarding duration of followup. Angle recession glaucoma can take a longer duration to develop.

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