

# Hospital-Based, Prospective Interventional Assessment of the Clinical Profile of Raised Intraocular Pressure in Closed Globe Injury and its Management

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Conflict of interest: Nil

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## Abstract

**Aim:** To recognize the causes of raised intraocular pressure (IOP) following blunt trauma, severity of disease and its management is made in this study.

**Material & Methods:** This hospital-based, prospective interventional study was conducted at the Department of Ophthalmology, Madhubani Medical College, Madhubani, Bihar, India over a period of six months. After obtaining ethics clearance from Institutional Ethics Committee, 40 patients attending the glaucoma department with closed globe injury followed by raised IOP of > 21 mm Hg willing to give a written, informed consent were included in the study.

**Results:** Most common mode of blunt injury was industrial accidents (32.5%), followed by injury while playing (25%). Out of 40 eyes, 29 eyes (72.5%) were managed by medical therapy alone. 11 eyes (27.5%) underwent surgical management. 32 eyes, 5 eyes, 2 eyes and 1 eye had a vision of 6/6, 6/12, 6/18 and 6/24 respectively.

**Conclusion:** There was no significant difference between medical and surgical intervention while treating glaucoma secondary to closed globe injury.

**Keywords:** intraocular pressure, closed globe injury, ocular injury

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## Introduction

Ocular trauma is an important cause of ocular morbidity and represents the most common ocular emergency. [1] Ocular injuries range from sub conjunctival hemorrhage, without much visual significance to sight threatening injuries such as globe ruptures and retinal detachments.

Individuals in their productive age are the most common victims, especially children and those involved in sports, industrial, and construction workers, thus imposing a heavy burden on our economy. [1-2]

An attempt to recognize the causes of raised intraocular pressure (IOP) following blunt trauma, severity of disease and its management is made in this study.

## Material & Methods:

This hospital-based, prospective interventional study was conducted at the Department of Ophthalmology, Madhubani Medical College, Madhubani, Bihar, India over a period of six months. After obtaining ethics clearance from Institutional Ethics Committee, 40 patients

attending the glaucoma department with closed globe injury followed by raised IOP of > 21 mm Hg willing to give a written, informed consent were included in the study.

The cases were followed up - at one week, at 1 month, at 3 months, at 6 months and at 12 months. At each visit, patient's BCVA was tested by Snellen's, slit lamp examination, IOP measurement by Goldmann's applanation tonometer, gonioscopy using a Sussman type 4-mirror handheld gonioscope, stereoscopic fundus examination using +90D/+78D was undertaken. Visual fields using Humphrey automated perimetry was done at 1-, 3-, 6- and 12-month's interval. Response to treatment was assessed based on IOP reduction to target IOP range, as measured on Goldmann applanation tonometer. Patients who were on anti-glaucoma medications, compliance to treatment was checked at every visit and response to treatment was assessed based on IOP reduction. Medication was chosen based upon IOP control, target pressure, status of optic nerve head, visual fields and compliance of patients to medical treatment.

Patients in whom the hyphaema was non resolving with uncontrolled IOP or blood

stained cornea were taken up for paracentesis after obtaining written informed consent. Patients having lens dislocation /subluxation were taken up for lensectomy  $\pm$  Intraocular lens (IOL) implantation after obtaining written informed consent. Patients with traumatic cataract which was visually significant were taken up for small incision cataract surgery (SICS) with or without IOL implantation after obtaining written informed consent. Trabeculectomy alone or with combined cataract extraction was planned in patients in whom IOP remained uncontrolled despite maximally tolerated medical therapy, progressive glaucomatous damage on maximum medical therapy and with corresponding visual field changes, patient unable to tolerate or adhere to medical regimen after obtaining written informed consent.

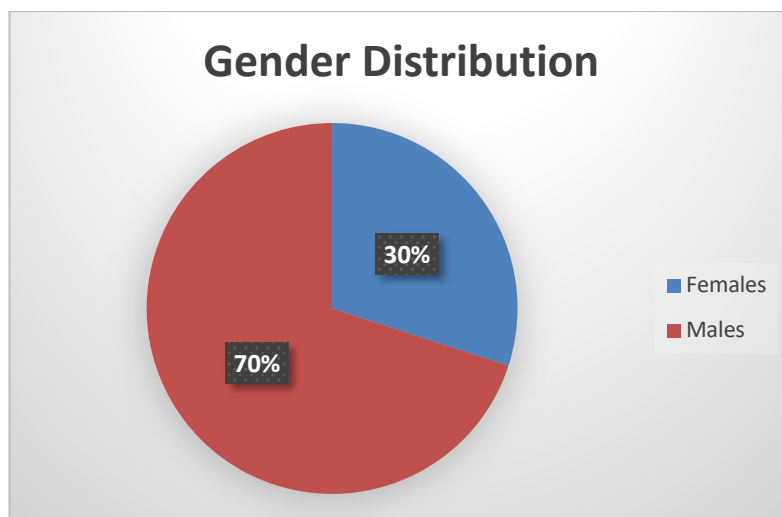
The data was entered in MS Excel spread sheet and analysis using IBM SPSS version 24.0 software. Results presented as descriptive statistics in the form of mean/proportion and percentage and possible association was derived by using suitable parametric and nonparametric tests of significance. Results are presented as tables, charts and figures applicable.

### Results:

**Table 1: Age distribution of study participants**

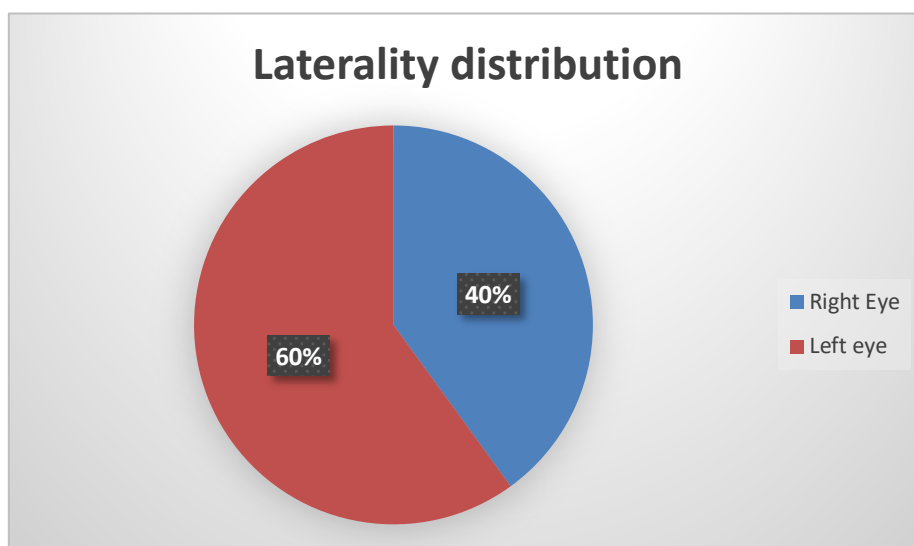
Age	Number	Percentage
$\leq 20$ Years	04	10%
21 to 40 Years	14	35%
41 to 60 Years	19	47.5%
Total	40	100.0
Mean $\pm$ SD	34.33 $\pm$ 15.18	
Minimum age	09	
Maximum age	60	

4 patients (10%) were  $\leq 20$  years. 14 patients (35%) belonged to 21-40 years and 13 patients (47.5%) belonged to 41 to 60 years. Minimum and maximum age being 9 and 60 years respectively. Mean age distribution of study participants. SD 15.18 years.(Table 1)



**Figure 1: Gender Distribution**

28 (70%) of study participants were males and 12 (30%) were females. (Figure 1)



**Figure 2: Laterality distribution of study participants**

In our study, right eye was involved in 16 (40%) subjects and left eye in 24 (60%) subjects. (Figure 2)

**Table 2: Cause of injury in study participants**

Cause	Number	Percentage (%)
Assault	2	5
Injuries while farming	4	10
Home accident	9	22.5
Industrial accident	13	32.5
Injuries while playing	10	25
RTA (road traffic accident)	2	5
Total	40	100.0

Most common mode of blunt injury was industrial accidents (32.5%), followed by injury while playing (25%) and home accidents (22.5%). Injuries while farming accounted for 10% of total injuries. The least common causes being assault (5%) and road traffic accident (5%). [Table 2]

**Table 3: Initial vision of study participants**

Initial vision on snellen's Chart	Number of Patients
6/9	02
6/12	02
6/18	05
6/24	14
6/36	06
6/60	03
Hand movements	08

2, 2, 5, 14, 6, 3, 9 study subjects had vision of 6/9, 6/12, 6/18, 6/24, 6/36, 6/60 and Hand movements respectively. [Table 3]

**Table 4: Cornea injury distribution of study participants**

Corneal Injury	Number	Percentage (%)
Present (Lamellar tear)	5	12.5
No	35	87.5
Total	40	100.0

Corneal injury at presentation was seen only in 5 subjects (12.5%) with all being lamellar tears while remaining 35 patients (87.5%) had no corneal injury. (Table 4)

**Table 5: Hyphaema distribution of study participants**

Hyphema	Number	Percentage (%)
Present	21	52.5
Absent	19	47.5
Total	40	100

Hyphaema on presentation was seen in 21 eyes (52.5%) while remaining 19 eyes (47.5%) had no hyphaema. (Table 5)

**Table 6: Iris injury distribution of study participants**

Lens	Number	Percentage (%)
Present	11	27.5
Absent	25	62.5
No view	04	10
Total	32	100.0

11 eyes (27.5%) had lens injury, 25 eyes (62.5%) did not have lens injury and 4 eyes (10%) had no view. (Table 6)

**Table 7: Management modality of study participants**

Management	Number of patients	Percentage (%)
Medical therapy	29	72.5
Surgical	11	27.5
<b>Total</b>	<b>40</b>	<b>100</b>

Out of 40 eyes, 29 eyes (72.5%) were managed by medical therapy alone. 11 eyes (27.5%) underwent surgical management. Out of these, 5 eye surgeries were attributable to failed medical management. (Table 7)

**Table 8: Management modality of study participants at each follow up**

Management	Presentation	1 <sup>st</sup> Week	1 <sup>st</sup> Month	3 Months	6 Months	12 Months
Medical	39(97.5%)	36(90%)	38(95%)	36(90%)	39(97.5%)	40(100.0)
Surgical	01(2.5%)	04(10%)	02(5%)	04(10%)	01(2.5%)	0(0.0)
Total	40(100.0)	40(100.0)	40(100.0)	40(100.0)	40(100.0)	40(100.0)

Table 8 shows Management modality of study participants at each follow up. Significant improvement was seen with medical modality.

**Table 9: Final vision of study participants**

Final vision on Snellen's chart	Number of Patients
6/6	32
6/12	05
6/18	02
6/24	01

32 eyes, 5 eyes, 2 eyes and 1 eye had a vision of 6/6, 6/12, 6/18 and 6/24 respectively. (Table 9)

### Discussion:

Studies by Fung et al. and Kaur et al. have reported control of IOP with medical management in 86.7% cases and 58.3% cases, respectively. [3-4] Ozer et al., in a study from adult eyes, have reported factors associated with need for glaucoma surgery like hyphema, corneal injury, poor visual acuity, penetrating injuries, and optic atrophy. [5]

Mishra et al. [6] in their study also showed that majority of ocular injuries occurred in individuals in the productive age group. Mishra et al. [4] in their study reported that >50% patients were under alcohol influence. [6]

Danenberg et al [7] in their study of 635 patients has reported that 75% of the patients with ocular traumas are <40 years. According to the study conducted by Jain BS, Sony SR, the maximum incidence of ocular injuries were seen in the age group of 16 to 30 years (63%) and in children below 16 years (23.2%) mostly due to unsupervised play by their parents. [8]

Blunt injuries comprised ecchymosis, corneal abrasions, sealed perforations, sub conjunctival hemorrhage, and hyphema. Penetrating injuries included corneal or sclera tears and globe ruptures. In a study conducted by Shukla et al., [9] 66.7% had closed globe injuries, whereas 26.7% had open globe injuries.

Girkin et al [10] reported 0.5% vitreous injury and 2 % choroidal injury which is

similar to our study. Sihota et al [5] reported 17.5% vitreous hemorrhage and 20% choroidal rupture which is more than our study.

Usha vasu et al [11] conducted a retrospective study on occupational globe injury and found that 43 out of the 129 cases (33.3%) to be occupation related. Karaman K et al [12] have reported in their study that only 13.8% of the injuries are related to agriculture and our study constituted 9.4% of farm injuries. Patrick Kearns [13] in his retrospective study of 314 cases has reported 17.8% of the injuries to be home accidents, 9.95% to be work accidents and assault 10.8% of injuries. Punnonen et al [14] found that 40% of the ocular trauma is due to domestic/playing accidents and 36% were occupational. [15]

### Conclusion:

There was no significant difference between medical and surgical intervention while treating glaucoma secondary to closed globe injury. Glaucoma that follows trauma is a major concern because many cases may go unnoticed and without close follow-up are diagnosed many years later as having irreversible glaucomatous optic nerve damage. Prompt diagnosis and early treatment is the key to prevent blindness occurring due to traumatic glaucoma.

### References:

1. Wong TY, Tielsch JM. Epidemiology of ocular trauma. In: Tasman W, Jaeger EA, editors. Duane's Ophthalmology. Philadelphia: Lippincott Williams and Wilkins; 2008.

2. Krishnaiah S, Nirmalan PK, Shamanna BR, Srinivas M, Rao GN, Thomas R, et al. Ocular trauma in a rural population of Southern India: The Andhra Pradesh eye disease study. *Ophthalmology* 2006;113:1159-64.
3. Kaur S, Kaushik S, Singh Pandav S. Traumatic glaucoma in children. *J Curr Glaucoma Pract* 2014;8:58-62.
4. Fung DS, Roensch MA, Kooner KS, Cavanagh HD, Whitson JT. Epidemiology and characteristics of childhood glaucoma: Results from the Dallas Glaucoma Registry. *Clin Ophthalmol* 2013;7:1739-46.
5. Ozer PA, Yalvac IS, Satana B, Eksioglu U, Duman S. Incidence and risk factors in secondary glaucomas after blunt and penetrating ocular trauma. *J Glaucoma* 2007;16:685-90
6. Mishra A, Verma AK, Baranwal VK, Aggarwal S, Bhargava N, Parihar JK. The pattern and visual outcomes of ocular trauma in a large Zonal hospital in a non-operational role: A 36 months retrospective analysis. *J Clin Ophthalmol Res* 2014;2:141-4.
7. Dannenberg A. Eye injuries related to assault. *Arch Ophthalmol*. 1992;110:849-52.
8. Jain BS, Sony SR. ocular injuries an analytic study in a teaching general hospital. *Indian J Ophthalmol*. 1987;35(3):112-6.
9. Shukla B, Agrawal R, Shukla D, Seen S. Systematic analysis of ocular trauma by a new proposed ocular trauma classification. *Indian J Ophthalmol* 2017;65:719-22.
10. Girkin CA, Mcgwin G, Long C, Morris R, Kuhn F. Glaucoma after ocular contusion. *J Glaucoma*. 2005;14(6):470-3.
11. Vasu U, Vasnaik A, Battu RR, Kurian M, George S. Occupational globe injuries. *Indian journal of Ophthalmology*. *Indian J Ophthalmol*. 2001;49(1):43-7.
12. Karaman K, Znaor L, Lakos V, Olujic I. Epidemiology of pediatric eye injury in Split-Dalmatia County. *Ophthalmic Res*. 2009;42(4):199-204.
13. Kearns P. Traumatic hyphema, Retrospective study of 314 cases. *Br J Ophthalmol*. 1991;75(3):137-41.
14. Punnonen E. Epidemiological and social aspects of eye injuries. *Acta Ophthalmol (Copenh)*. 1989;67(5):492-8.
15. Diane S., Baldé A. K., Camara F., & Diane M. H. Problématique du traitement de limbo-conjonctivite et endémique des tropiques. *Journal of Medical Research and Health Sciences*, 2022; 5(9): 2244-2249.