

## Traumatic cataract- factors affecting visual outcome

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### Abstract

**Aim:** Ocular trauma can result in myriad of presentations, traumatic cataract being one of them. The aim of present study is to find out etiological factors, demographic profile, factors affecting visual outcome in patients of traumatic cataract. **Method and Material:** A Prospective observational study was conducted in the department of Ophthalmology, Gandhi Medical College, Bhopal. A total of 50 patients were examined and findings were analyzed. **Outcome measures:** Final visual outcome. **Result:** We found that people in most productive years of life are more susceptible to injury causing traumatic cataract. Most of the injuries are sustained at workplace or home. Visual outcome in Traumatic cataract depends upon initial visual acuity and associated ocular injuries. Proper management of postoperative complications can significantly improve the visual outcome. **Conclusion:** Traumatic cataract is an important cause of preventable blindness. People at workplace should be aware of possible injuries. Use of adequate protective measures can decrease the incidence of traumatic cataract.

**Keywords:** Traumatic cataract, Penetrating injury, Blunt injury, Visual outcome

### Introduction

Ocular trauma is one of the most important causes of avoidable blindness. Trauma can result in various injuries ranging from minor abrasion to blinding injuries like rupture of globe and optic nerve injuries. One of the common manifestations of trauma is traumatic cataract which can result following blunt or penetrating injuries. Traumatic cataract grossly differs from other forms of senile and acquired cataract not only in morphology but also in the visual outcome that can be achieved. Concurrent injuries to other ocular structures can have a significant bearing on the final visual acuity of the eye.

Birmingham Eye Trauma Terminology system was introduced by Kuhn F, Morris R [1]. It was a significant step in standardizing the ocular trauma nomenclature, classification and prognosticating the visual outcome. The Ocular Trauma Classification Group has developed a classification system Ocular Trauma Score [2].

It was based on BETTS and features of globe injury at initial examination. The Ocular Trauma Score carries significance for both patient and doctor. It categorizes

trauma by four parameters - type of trauma, grade, afferent pupillary defect and extent of injury. Although there is no standard classification for morphology of traumatic cataract but it does play a role in final visual outcome [3]. Various treatment modalities are available for the management of traumatic cataract. Cataractous lens can be removed as primary procedure or secondary procedure. Each procedure has its own advantages and disadvantages [4].

Similarly IOL can be implanted as primary procedure or secondary procedure. In case of severe corneal edema secondary implantation to be a better option as compared to primary implantation as it is associated with early visual rehabilitation and less post operative complications [4].

Primary removal with implantation is recommended if there is severe inflammatory reaction with cortical matter in anterior chamber [5].

The study was conducted with the aims and objectives to study the demographic profile, etiological factors, prognostic factors and suggesting the preventing measures. Awareness regarding these factors will guide ophthalmologist to maximize the visual outcome.

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## Material and Method

The study was conducted in Gandhi Medical College and Hamidia Hospital, Bhopal after obtaining permission from Ethical committee.

**Duration-** March 2017 to August 2018.

**Type of study-** Prospective observational study

### Inclusion criteria

- Cases willing for participation.
- Cases with penetrating or blunt injury which lead to traumatic cataract formation.

### Exclusion criteria

- All others types of cataract like those caused by electric shock, radiation exposure were not included.
- Patients who had history of previous ocular pathology, ocular surgery or congenital malformation.
- Patients not consenting for research.
- Patients with poor compliance to treatment.

**Data collection procedure-** 50 patients presenting to Eye OPD were enrolled. History was recorded with reference to the following points-

- Demographic profile
- Symptomatology
- Mode of injury
- Activity while injury
- Occupation
- Use of protective measures
- Time interval between injury and presentation to hospital.

The visual acuity was assessed on Snellen's chart in a semi dark room and converted into logMAR scale for comparison and evaluation. For patients with severe visual loss the visual acuity was recorded in terms of Finger Counting (FC), Hand Movement appreciation (HM) and perception of light (PL).

All the patients enrolled in the study were subjected to detailed meticulous examination of both anterior segment and posterior segment. The anterior segment and adnexa were examined with torch and lamp followed by slit lamp biomicroscopy. Examination of pupillary reaction was done and presence of RAPD or APD or traumatic mydriasis was noted. Fundus examination was done with indirect ophthalmoscope and scleral indentation in patients with blunt injury without hyphema. Periphery was examined for retinal dialysis, retinal tear, commotio retinae. The findings were documented on standard proforma. In presence of opaque media posterior segment was evaluated by B-Scan.

In cases with suspected intraocular/intraorbital foreign body, additional imaging modalities were used such as X-Ray and CT Scan.

According to BETTS classification patients were categorized as open globe injury and closed globe injury[1]. Tonometry was done by Applanation tonometer in cases of blunt injury. After examination and diagnosis, patients were subjected for routine blood and urine investigations. In cases of polytrauma cardiovascular system, respiratory system, central nervous system and per abdomen were examined. Physician and anaesthetist reference were done for fitness to undergo surgery and surgery was done in presence of anaesthetist.

Preoperative keratometry was done by autorefractometer and IOL power was calculated by A-Scan. In those cases of corneal injury where mires were not formed keratometric value of fellow eye was taken and IOL power was calculated. Primary or secondary implantation was done. Associated complications were noted. Data analysis- The data thus collected was recorded on pre-designed proforma and managed on a spread sheet (Excel Sheet). Appropriate statistical tests were used to analyse the results. "Kruskal Wallis" test was used to determine the significance of changes between two groups. The "Chi Square", "T" test and "Z test" was used to compare the categorical data. Level of significance in statistical test was 0.05.

**Result-** In the present study we analyzed 50 cases of traumatic cataract. It was observed that the age ranged from 4- 60 years with mean age of  $22.38 \pm 14.89$  years (Table 1). Most common affected age group was 11-20 years. 37 cases (74%) were reported in male population whereas 13 cases (26%) were female patients (statistically significant).

**Table-1: Age wise distribution of total patients**

Age group	Male	Female	Total	Percentage
<10 years	7	2	9	18%
11-20 years	14	5	19	38%
21 - 30 years	11	2	13	26%
31- 40 years	1	1	2	4%
41 - 50 years	1	2	3	6%
> 50 years	3	1	4	8%

Chi square test "p" value 0.65 not significant.

We observed 34 cases (68%) had traumatic cataract due to open globe injury and 16 cases (32%) had due to closed globe injury (statistically significant\* Table 2).

**Table-2: Distribution of patients with reference to type of injury.**

Type of trauma	Male	Female	No of cases	Percentage
Closed globe	14	2	16	32%
Open globe	23	11	34	68%
<b>Total</b>	<b>37</b>	<b>13</b>	<b>50</b>	<b>100%</b>

\*Z test "p" value = 0.00016 significant

Wooden stick was the most common cause of injury followed by stone and iron nail. Other objects are door handle, cow horn, key ring, glass piece.

Among total patients maximum numbers of injuries were sustained at home followed by activity at workplace like cutting woods or stone. Among adult population maximum numbers of injuries were sustained at workplace followed by home, whereas among pediatric population home was the most common place (Table 3).

**Table-3: Activity while injury**

Place	Pediatric	Adult	Frequency	Percentage
Workplace	0	14	14	28%
Playing	5	4	9	18%
Home	10	12	22	44%
Road Traffic Accident	0	2	2	4%
Unknown	0	3	3	6%
<b>Total</b>	<b>15</b>	<b>35</b>	<b>50</b>	<b>100.0%</b>

We assessed that final mean visual acuity of pediatric patients was  $1.2 \pm 0.82$  (logMAR) and in adult patients was  $0.97 \pm 0.9$  (logMAR).

The numbers of patients in different visual acuity groups were compared at initial and final presentation (Table 4). Except for no PL group there was statistically significant improvement in final visual outcome. 58% patients attained vision better than 20/200. Also final visual acuity depends on the initial visual acuity. Better initial visual acuity has good final visual outcome. On comparison of initial and final VA statistically significant improvement was found except for NLP group.

**Table-4: Effect of initial visual acuity on final visual outcome.**

Visual acuity (in feet)	Initial VA		Final VA	
	Frequency	Percentage (%)	Frequency	Percentage (%)
NLP	4	8	4	8
LP/HM	22	44	5	10
1/200-19/200	12	24	11	22
20/200-20/50	8	16	20	40
≥20/40	4	8	9	18
<b>Total</b>	<b>50</b>	<b>100</b>	<b>49</b>	<b>98</b>

Chi square test, “p” value – **0.0013**- significant

Most (52%) of the open globe injury patients reported within one week as open globe injury patients are more apprehensive as compared to closed globe injury. The visual outcome between open globe injury and closed globe injury was analyzed and found that the visual outcome is better in closed globe injury as compared to open globe injury. The mean VA in open globe injury was log MAR 1.13±0.9 where as in closed globe injury mean VA was 0.86±0.80. Among open globe injury, patients with anterior segment injuries had better visual outcome (logMAR 1.02±0.73) than patients with anterior and posterior segment injuries (logMAR 1.45±1.3). In the present study final VA of ≥20/40 was achieved in 18% of patients, whereas VA of >20/60 was achieved in 34% of patients. After assessing the anatomical structures affected together with the lens, it was observed that corneal injury to be the most commonly associated with traumatic cataract followed by uveal tissue injury in anterior segment whereas in posterior segment vitreous hemorrhage, retinal detachment, retinal edema was commonly associated, orbital wall fracture and intraocular foreign body were least common finding (Table 5).

**Table-5: Associated ocular injuries.**

Associated ocular injuries	No of cases	Percentage
Cornea	28	56
Uveal prolapse	19	38
Hyphema	14	28
Vitreous hemorrhage	14	28
Retinal edema	7	14
Retinal detachment	7	14
Choroidal detachment	3	6
Intraocular foreign body	1	2
Orbital wall fracture	1	2
Subluxation	4	8

## Discussion

In the present study, male population was more affected than female population with a ratio of 2.85:1 as male are more involved in sports and outdoor activities. Similar results were obtained by Abdul Rahim Aldinaet al, Poonam N. Kalyanpadet al and Menon MN et al

[6,7,8]. A majority of patients in the present study had traumatic cataract due to open globe injury (68%) as compared to closed group injuries (32%). Other studies suggested that penetrating injury was common than blunt trauma [6,9,10]. However Shrivastava et al did not

find significant difference between open and closed globe injuries and Ahmad Nadeem Aslami et al suggested that penetrating injury was common in less than fifteen years of age but in higher age group blunt trauma was more common [11,12]. Ying Q et al found that open globe injury accounted for 73.8% to cause traumatic cataract [13].

Injuries were caused mechanically by different objects. The most common objects were stone and wooden sticks. The former was seen in adults while working and latter in children while playing. Gogate et al and Tewari et al reported same in their study, Khokhar et al observed bow and arrow to be the most common object [9,14,15].

Visual outcome was better in adult population as compared to pediatric population in the present study but difference was statistically insignificant. Similar result was suggested by Shrivastava et al [11]. However other studies suggested a favorable outcome in younger age groups except children under the age of five years who are prone to develop amblyopia [16]. This was probably due to the fact that we compared post operative outcome and complications like posterior capsular opacification and amblyopia if managed effectively can lead to better visual outcome in pediatric patients.

After analyzing visual acuity at presentation with the final visual acuity, we observed significant improvement in final visual outcome except for no PL group. Also final visual acuity depends on the initial visual acuity. Better initial visual acuity has good final visual outcome. Ying Q et al, Abdul Rahim Aldina et al, Shah et al had similar results on initial visual acuity as predictive factor [13,6,17].

We observed the visual outcome between open globe injury and closed globe injury and found that the visual outcome is better in closed globe injury as compared to open globe injury. The mean VA in open globe injury was logMar 1.13±0.9 where as in closed globe injury mean VA was 0.86±0.80. Other studies which had similar results are Ahmad Nadeem Aslami et al and Ying Q et al [12,13]. Brar et al also suggested similar results in pediatric traumatic cataract patients. It may be probably due to more vision threatening complications in open globe injury [16].

**Limitation** – The ocular trauma score was attempted to be calculated for every case but it was difficult in pediatric cases as well as those with iris tissue injury.

## Conclusion

In the present study, it was observed that most susceptible age group for sustaining injury was 10-30 years. Sexual predilection was found in male population as they are more involved in sports and outdoor activities. Open globe injury was common cause for causation of traumatic cataract as compared to closed globe injury. Most of the injuries were inflicted during working and playing as people don't routinely use protective measures. Most of the injuries are preventable and hence necessary preventive measures can reduce the incidence of traumatic cataract. Objects commonly responsible for trauma were stone and wooden stick.

The present analysis suggested that visual acuity at presentation is a strong predictor of final visual outcome. The outcome of closed globe injury was better than open globe injury as open globe injury are associated with more vision threatening complications like corneal opacity, astigmatism. The common anterior segment complications were corneal opacity and posterior capsular opacification while vitreous hemorrhage, retinal edema were seen in posterior segment. Timely management of amblyopia, posterior capsular opacification and other complication can improve the final visual outcome.

Among traumatic cataract cases open globe injury was more frequent than closed globe injury. Only one third of the present patients achieved satisfactory visual outcome (>20/200). Corneal opacity and posterior capsular opacification were the common cause for poor visual outcome.

Awareness regarding importance of early intervention can result in favorable outcome. Removal of cataract does not complete the management of traumatic cataract. Aggressive management of post operative complications should be done to improve the final visual outcome.

## What this study adds to existing knowledge?

The factors which affect the visual outcome are the age of patient, extent of injury of associated ocular structures, visual acuity at presentation, type of injury. Male population in productive years of life are most susceptible for traumatic cataract. Workplace and playground are the common places to sustain injury for adults whereas children are injured at home. Preventive measures at work place can reduce the incidence of traumatic cataract.

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