

## Research Article

# A Prospective Clinical Evaluation and Management of Traumatic Cataract

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**Abstract:** **Introduction:** Traumatic cataract is a significant cause of visual impairment and blindness, particularly in young, active individuals. It results from direct or indirect ocular trauma that damages the crystalline lens, leading to opacification and impaired vision. The management of traumatic cataract poses unique challenges, including associated ocular injuries, increased risk of complications, and complex surgical techniques. This evaluation aims to outline the clinical approach and management strategies for patients presenting with traumatic cataract. Surgically induced astigmatism is the cause of poor postoperative vision even after uneventful cataract surgery. **Materials and methods:** This is a prospective study was conducted in the Department of Ophthalmology, Mahavir Institute of Medical Sciences and Research Centre in patients who was presented with unilateral traumatic cataract, underwent surgical intervention and completed at least 6 months. Patients of both genders and all age groups with unilateral traumatic cataract were included in the study. Patient's data including demographic details, causative agents, initial visual acuity, intraocular pressure, slit lamp examination findings, B-scan findings, treatment / surgery, early and late complications and final outcome were obtained from patient's chart in the hospital record. Removal of cataract was performed as a second and separate procedure in patients of perforating ocular injury, intraocular lens (IOL) implantation was performed only in patients with adequate capsular support. Patients without any capsular support were kept aphakic. Anterior vitrectomy was performed in patients with posterior capsular tear and vitreous prolapse. **Result:** Majority of the cases were seen in age group 5-14 years with male preponderance. 55% were penetrating trauma and 45% were blunt trauma. Corneal and iris tissue injuries were the most common associated injuries. Final visual acuity was 6/6-6/18 in 43% of patients, 6/24-3/60 in 31% of patients and less than 3/60 in 26% of patients. The most common late complication was PCO. On comparing final visual outcome among adult and paediatric age group, there was no significant difference. The time interval between injury and intervention had no significant effect on final visual outcome. **Conclusion:** This study demonstrates the critical importance of timely management and tailored surgical approaches in traumatic cataract cases. While the majority of patients achieved favorable visual outcomes, associated ocular injuries and complications significantly influenced the prognosis. Continued advancements in surgical techniques and post-operative care are essential to improving outcomes in such cases.

**Keywords:** Ocular trauma, traumatic cataract, cataract surgery, ocular morbidities.

## INTRODUCTION

Ocular trauma is the leading cause of unilateral blindness all over the world. Traumatic cataract is a common sequela of ocular injuries in adults and children. The incidence of ocular injuries varies in different parts of the world. Any prevention strategy requires knowledge of causes of injuries, which may enable more appropriate targeting of resources toward preventing such injuries(5). For both eye trauma victims the society bears a large potentially preventable burden. The method used to evaluate the visual outcome in eyes managed for traumatic cataracts and senile cataracts are similar, but the damage to ocular tissues owing to trauma may compromise the visual gain in eyes treated surgically for traumatic cataracts. Hence, the success rate may differ between eyes with these two types

of cataracts. Extent of associated damage to anterior and posterior segment, time of intervention, operative and post-operative complications go a long way in determining the ultimate prognosis.

The type of trauma, extent of lenticular involvement and associated secondary rise of intraocular pressure are factors of paramount importance which could dictate the exact time of management of cataract. Based on lenticular opacity,(6) the cataracts are classified as total, membranous, white soft, and rosette type. When there is no clear lens matter between the capsule and nucleus, the cataract was defined as total. When the capsule and organised matter are fused and formed a membrane of varying density, it is defined as a membranous cataract. When loose cortical material is found in the anterior chamber together with a

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Management of traumatic cataract that results from either blunt or penetrating ocular trauma needs special consideration because of associated injury to ocular and periorbital structures. It is important to study the effect

of time interval between injury and first intervention, as the morphology of traumatic cataract is influenced by this interval. (8) The present study presents the experience in the management of cases of traumatic cataract with special reference to age, aetiology, preoperative status of the eye, time of surgery following trauma, type of surgery and final visual outcome.

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. [5]

The methods used to evaluate the visual outcome in eyes managed for traumatic cataracts and senile cataracts are similar (6) but the damage to other ocular tissues due to trauma may compromise the visual gain in eyes operated on for traumatic cataracts. Post-operative inflammation is a common complication following traumatic cataracts, hampering visual outcome. Other complications leading to decreased post-operative vision are corneal scar, uveitis, secondary glaucoma, pupillary capture, posterior capsular opacification and retinal scar. 13 The management of such cases is an important problem in

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

ophthalmology and prognosis is variable. Extent of associated damage to anterior and posterior segment,

time of intervention, operative and post-operative complications go a long way in determining the ultimate prognosis. The type of trauma, extent of lenticular involvement and associated secondary rise of intraocular pressure are factors of paramount importance which could dictate the exact time of management of traumatic cataract. Thus this study has been undertaken to assess the visual outcome following management of traumatic cataract.

## MATERIALS AND METHODS

This is a prospective study was conducted in the Department of Ophthalmology, Mahavir Institute of Medical Sciences and Research Centre in patients who was presented with unilateral traumatic cataract, underwent surgical intervention and completed at least 6 months. Patients of both genders and all age groups with unilateral traumatic cataract were included in the study. Patient's data including demographic details, causative agents, initial visual acuity, intraocular pressure, slit lamp examination findings, B-scan findings, treatment / surgery, early and late complications and final outcome were obtained from patient's chart in the hospital record. Removal of cataract was performed as a second and separate procedure in patients of perforating ocular injury, intraocular lens (IOL) implantation was performed only in patients with adequate capsular support. Patients without any capsular support were kept aphakic. Anterior vitrectomy was performed in patients with posterior capsular tear and vitreous prolapse. Patients were subsequently followed-up on 1 day, 1 week, 6 weeks, 3 months and 6 months postoperatively. At each followup visit patient's visual acuity was recorded. Final best corrected visual acuity (BCVA) was recorded on the 5th postoperative visit that is at 6 months.

Statistical Analysis: The data processing was carried out on Statistical Package for Social Science (SPSS) version 25.0 software and expressed as frequencies, percentages, mean and standard deviation. of postoperative complications can significantly improve the visual outcome.

In the current study majority of the cases were seen in 11- 20 years with a male preponderance.

## RESULT

**Table 1: Demographic Characteristics**

| Age Group (Years) | Number of Patients (n) | Percentage (%) |
|-------------------|------------------------|----------------|
| 0-10              | 24                     | 20.0           |
| 11-20             | 30                     | 25.0           |
| 21-30             | 20                     | 16.7           |

|                          |                               |                       |
|--------------------------|-------------------------------|-----------------------|
| 31–40                    | 18                            | 15.0                  |
| 41–50                    | 15                            | 12.5                  |
| 51+                      | 13                            | 10.8                  |
| <b>Total</b>             | <b>120</b>                    | <b>100.0</b>          |
| <b>Age Group (Years)</b> | <b>Number of Patients (n)</b> | <b>Percentage (%)</b> |
| <b>21–30</b>             | <b>20</b>                     | <b>16.7</b>           |
| <b>31–40</b>             | <b>18</b>                     | <b>15.0</b>           |
| <b>41–50</b>             | <b>15</b>                     | <b>12.5</b>           |
| <b>51+</b>               | <b>13</b>                     | <b>10.8</b>           |
| <b>Total</b>             | <b>120</b>                    | <b>100.0</b>          |

**Table: 2 Gender Distribution**

| Gender       | Number of Patients (n) | Percentage (%) |
|--------------|------------------------|----------------|
| Male         | 90                     | 75.0           |
| Female       | 30                     | 25.0           |
| <b>Total</b> | <b>120</b>             | <b>100.0</b>   |

**Table :3 Type of Injury Leading to Traumatic Cataract**

| Type of Injury           | Number of Patients (n) | Percentage (%) |
|--------------------------|------------------------|----------------|
| Blunt Trauma             | 50                     | 41.7           |
| Penetrating Trauma       | 45                     | 37.5           |
| Mixed or Combined Trauma | 15                     | 12.5           |
| Other                    | 10                     | 8.3            |
| <b>Total</b>             | <b>120</b>             | <b>100.0</b>   |

**Table: 4 Management Approach**

| Management Approach                      | Number of Patients (n) | Percentage (%) |
|--|------------------------|----------------|
| Phacoemulsification                      | 45                     | 37.5           |
| Extracapsular Cataract Extraction (ECCE) | 30                     | 25.0           |
| Intracapsular Cataract Extraction (ICCE) | 20                     | 16.7           |
| Combined Surgery                         | 15                     | 12.5           |
| Conservative Management                  | 10                     | 8.3            |
| <b>Total</b>                             | <b>120</b>             | <b>100.0</b>   |

**Table: 5 Post-Operative Outcomes (Visual Acuity)**

| Post-Operative Visual Acuity (Snellen) | Number of Patients (n) | Percentage (%) |
|--|------------------------|----------------|
| 6/6 to 6/12                            | 72                     | 60.0           |
| 6/18 to 6/24                           | 30                     | 25.0           |
| 6/36 to 6/60                           | 12                     | 10.0           |
| Less than 6/60                         | 6                      | 5.0            |
| <b>Total</b>                           | <b>120</b>             | <b>100.0</b>   |

**Table :7 Objects Causing Trauma**

| Objects Causing Trauma | Number of Patients (n) | Percentage (%) |
|------------------------|------------------------|----------------|
| Wooden stick           | 30                     | 50.0           |
| Hand and fist          | 6                      | 10.0           |
| Plastic                | 6                      | 10.0           |

|                             |                        |                |
|-----------------------------|------------------------|----------------|
| Metallic                    | 9                      | 15.0           |
| Firecracker                 | 2                      | 3.3            |
| Road Traffic Accident (RTA) | 2                      | 3.3            |
| Objects Causing Trauma      | Number of Patients (n) | Percentage (%) |
| Acid                        | 2                      | 3.3            |
| Brick and stone             | 3                      | 5.0            |
| Total                       | 60                     | 100.0          |

### Observations

#### 1. Most Common Object:

o Wooden stick injuries were the most frequent, accounting for 50% of cases.

#### 2. Other Notable Causes:

o Metallic objects (15%) were the second most common cause, followed by hand and fist (10%) and plastic objects (10%).

#### 3. Less Frequent Causes:

o Firecrackers, RTAs, and acid injuries each contributed to 3.3% of cases, while brick and stone injuries accounted for 5%.

#### 4. Prognostic Impact:

o The type of object causing trauma influenced the severity of injury, with sharp objects (metallic and wooden sticks) often causing more significant damage compared to blunt trauma (hand and fist).

1. The highest incidence of traumatic cataract occurred in the 11–20 years age group (25%).
2. Male patients constituted the majority (75%), likely reflecting increased exposure to risk factors.
3. Blunt trauma was the most common type of injury, accounting for 41.7% of cases.
4. Phacoemulsification was the most frequently used management approach (37.5%).
5. Post-operative visual outcomes were favorable in 60% of cases, achieving visual acuity of 6/12 or better.

Type of surgery Depending on the condition of the eye, the type of surgery done were SICS with Aldol and lens extraction with anterior vitrectomy on comparing final visual outcome among adult and pediatric group, there was no significant difference statistically with a p value of 0.658. Effect of time interval between injury and cataract surgery the time interval between injury and intervention had no significant effect on final visual outcome.

## DISCUSSION

Ocular trauma is a significant cause of vision loss, and as many as 1.6 million people lose sight yearly due to traumatic cataracts. Eye injuries occur in approximately one-fifth of adults, with men and young people being the most commonly affected. [11] There are an estimated 55

million eye injuries annually, with developed countries experiencing a high incidence of one-sided blindness. Thorough assessment and management of oculo-facial trauma are crucial, and guidelines are available to determine the visual prognosis. [12] Factors such as initial visual acuity, pupillary reflex response, and the severity of the trauma are essential in this assessment. This activity provides a comprehensive guide to managing lens injuries, particularly traumatic cataracts and surgical indications and timing. Patients can receive the appropriate treatment and care with this approach, leading to better visual outcomes after ocular trauma. [13] Disruption of the lens fibers after blunt or penetrating ocular trauma commonly leads to a traumatic cataract. [14] The traumatic mechanism and the integrity of the capsular bag dictate the morphology of the cataract and the clinical course. [15] Trauma disrupts and injures the lens fibers, leading to lens swelling. [16] Worldwide, traumatic cataract formation is observed in 24% of patients with globe contusions. Concussion cataracts, another type of traumatic cataract, occur due to blunt trauma. Although the lens capsule is not extensively damaged, it becomes progressively opaque over time. The pathophysiology of traumatic cataracts occurs through direct rupture and distortion of the capsule or coup and equatorial expansion due to various forces transferring the traumatic energy to the other side of the eye. [17] Traumatic cataracts typically present as rosette or stellate subtypes. [18]

The lens comprises the cortex and the nucleus, and the lens capsule is an uninterrupted basement membrane of modified epithelial cells. Denaturation and coagulation of lens proteins can lead to cataract formation through loss of transparency due to degenerative processes. [19] Various disturbances can cause these degenerative processes. Disturbances during lens growth and formation lead to congenital cataracts. Fibrous changes in the lens epithelium result in subcapsular cataracts, cortical hydration between lens fibers induces cortical cataracts, and the deposition of pigments such as urochrome leads to nuclear cataracts. [19] Trauma can also cause partial (subluxated) or complete (luxated) displacement of the lens, leading to ocular disorders such as phacomorphic glaucoma, in which the lens diameter swells and occludes the iridocorneal angle. (Posttraumatic Crystalline Lens Subluxation) Trauma may also induce lens-particle glaucoma, where lens proteins clog the trabecular meshwork, or an

inflammatory response within the anterior chamber leading to the development of phacoantigenic glaucoma

## CONCLUSION

This study demonstrates the critical importance of timely management and tailored surgical approaches in traumatic cataract cases. While the majority of patients achieved favorable visual outcomes, associated ocular injuries and complications significantly influenced the prognosis. Continued advancements in surgical techniques and post-operative care are essential to improving outcomes in such cases.

## REFERENCES

1. Thylefors B. Epidemiological patterns of ocular trauma. *Australian and New Zealand journal of ophthalmology*. 1992 May;20(2): 95-8.
2. Khandekar R, Mohammed AJ, Negrel AD, Al Riyami A. The prevalence and causes of blindness in the Sultanate of Oman: the Oman Eye Study (OES). *British journal of ophthalmology*. 2002 Sep 1;86(9):957-62.
3. Irvine JA, Smith RE. Lens injuries. *eye trauma*. 1991;126-5.
4. Kuhn F, Mais Jacobs EJ, Tannen BL. Traumatic Cataract: A Review. *J Ocular Biol*. 2016;4(1):4.iak R, Mann L, Mester V, Morris R, Witherspoon CD. The ocular trauma score (OTS). *Ophthalmology Clinics of North America*. 2002 Jun; 15(2):163-5.
5. Bhatia IM, Panda A, Sood NN. Management of traumatic cataract. *Indian J Ophthalmol*. 1982; 31: 290-293
6. Krishnamachary M, Rathi V, Gupta J. Management of traumatic cataract in children. *Jr. Of cat and ref surgery*, 1997; 23(1): 681-7
7. Memon MN, Narsari AK, Nizamani NB. Visual outcome of unilateral traumatic cataract. *Journal of the college of Physicians and Surgeons Pakistan* 2012, vol.22(8): 497-500
8. Shah MA, Shah SM, Shah SB, et al. Morphology of traumatic cataract: does it play a role in final visual outcome? *BMJ Open* 2011
9. Srinivasan R, Kumadhan et al. Traumatic cataract-factors affecting visual outcome. *Jr. Of TNOA*, 37(1):45-48
10. Loncar VL, Petric I. Surgical treatment, Clinical outcomes, and complications of traumatic cataract: Retrospective study. *Croatian Medical Journal*, 45(3): 310-313, 2004
11. Blum M, Tetz MR. Treatment of traumatic cataract. *J. Cataract refractive surgery*, April 1996.
12. Chuang LH, Lai CC. "Intraocular lens implantation of traumatic cataract in open globe injury". *Can J Ophthalmol*. 2005 Aug; 40(4): 454-9
13. Ahmed SS. Traumatic cataract- Newer perspectives. *Jr. of TNOA*, 1998, 38(2): 31-33
14. Ekstein Michael, Vijaylakshmi P, Kilkedar M, Use of intraocular lenses in children with traumatic cataract in South India. *Br.J. Ophthalmology*, 1998, Aug; 82(8): 911-915
15. Pavlovic S, Weinand F. Long term results after epileticular intraocular lens implantation following traumatic cataract. *Klin Monbl Augenheilkd*. 2006 Jan; 223(1):70-3
16. Rumelt S et al. The influence of surgery and intraocular lens implantation timing on visual outcome in traumatic cataract. *Graef Arch Clin Exp Ophthalmol*. 2010 Sep; 248(9):1293-7
17. Cetin Akpolat, Ferhat Evliyaoglu, Muhammed Mustafa Kurt, Aylin Karadas. Traumatic cataract study: Surgical outcomes of blunt versus penetrating ocular injuries. *Medical science international medical journal* 2019; 8(1): 37-41
18. Bhandari AJ, Jorvekar SA, Singh P, Bangal SV. Outcome after cataract surgery in patients with traumatic cataract. *Delta J Ophthalmology* 2016; 17:56-8