

A prospective clinical evaluation and management of Traumatic Cataract

Krishna Chaitanya P¹, Katari Ramya²

¹Assistant Professor, Department of Ophthalmology, RVM Institute of Medical Sciences and Research Centre

²Post Graduate, Department of Ophthalmology, RVM Institute of Medical Sciences and Research Centre

Corresponding Author: Katari Ramya

ABSTRACT

Background: 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. From India, the reported incidence is 20.53%. 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.

Materials and methods: This is a prospective study was conducted in the Department of Ophthalmology, RVM 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: In our study males were predominantly affected by traumatic cataract because of their nature of work and outdoor occupation. The age group of 5-25 years formed the core group of people to get traumatic cataract. The final visual outcome showed good result however the final visual outcome depends upon the extent of associated ocular injuries. Effective Intervention and management are the key points in preventing monocular blindness due to traumatic cataract.

Keywords: Cataract, Ocular trauma, Unilateral blindness, Traumatic cataract

INTRODUCTION

Ocular trauma is the leading cause of unilateral blindness all over the world.^[1] 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. From India, the reported incidence is 20.53%. 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.^[2]

Surgery of traumatic cataract can be primary or secondary. Primary cataract removal is suggested if the lens is fragmentized, swollen causing a pupillary block or to examine the posterior segment otherwise blocked by lens opacity. Secondary cataract removal is more beneficial because of improved visibility, proper intraocular lens calculation, and less chances of postoperative inflammation.^[3]

Ocular trauma can occur via many mechanisms, affecting the crystalline lens in various ways, including perforating or blunt trauma, electric shock, ultraviolet and ionizing radiation, and chemical injuries.^[4]

In penetrating trauma, where an object with a sharp edge, such as glass, wood, or metal, pierces the eye, a traumatic cataract may develop immediately if the object reaches the lens after passing through the cornea.^[5] The lens may also be damaged or completely ruptured, leading to partial or complete cataracts and blindness (Traumatic Cataract Secondary to Penetrating Ocular Injury). Chemical trauma may occur when a foreign substance enters the eye and alters the composition of the lens fibers, leading to traumatic cataracts. Radiation exposure can also damage and rupture the lens, resulting in traumatic cataracts over time. Radiation-induced ocular trauma is often seen in children.^[6]

Opacification of the lens may occur immediately after an injury or years later; the type of cataract formed will depend on the nature and extent of the ocular trauma. Penetrating trauma may result in a cataract proportional to the size of the opening in the lens capsule. No morphologic grouping exists for cataracts due to penetrating trauma.^[7]

In contrast, cataracts secondary to blunt trauma often exhibit a distinctive rosette- or flower-shaped appearance. Larger capsular openings can cause the entire lens to become cataractous, while smaller openings may produce only a focal opacity.^[8] Additionally, blunt trauma can cause cataract formation without a loss of capsular integrity due to the forces of the original

trauma or subsequent inflammation. Ocular trauma may also lead to subcapsular cataracts. [9] Electric shock can cause diffuse milky-white opacification or multiple snowflake-like opacities. Ultraviolet radiation can induce true exfoliation of the anterior lens capsule with subsequent cataract development. The ionizing radiation used to treat ocular tumors or during cardiac interventions may cause posterior subcapsular opacities. Finally, chemical injuries to the lens can result from various sources, including naphthalene, thallium, lactose, and galactose. [10]

The aim of this study was to evaluate the final visual outcome of a series of patients with secondary extraction of traumatic cataract along with demographic features and modes of trauma.

MATERIALS AND METHODS

This is a prospective study was conducted in the Department of Ophthalmology, RVM 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 follow-up 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.

RESULTS

In the current study majority of the cases were seen in 5-15 years with a male preponderance.

Table 1: Age Distribution

Age	No. of patients	Percentage%
0-15	24	40%
15-24	18	30%
25-34	6	10%
35-44	9	15%

>45	3	5%
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Table 2: Sex Distribution

Sex	No. of patients	Percentage %
Male	42	70%
Female	18	30%

Table 3: Type of injury

Type of injury	No. of patients	Percentage %
Penetrating	33	55%
blunt	27	45%

In table 3, 55% were penetrating trauma and 45% were blunt trauma. Wooden stick was the most common object causing trauma.

Table 4: Objects causing trauma

Objects causing trauma	No. of patients	Percentage %
Wooden stick	30	50%
Hand and fist	6	10%
Plastic	6	10%
Metallic	9	15%
Fire cracker	2	3.3%
RTA	2	3.3%
Acid	2	3.3%
Brick and stone	3	5%

Table 5: Associated Ocular Damage

Associated Ocular Damage	No. of patients	Percentage
Corneal (corneoscleral) tear	33	55%
Injury to iris	15	25%
Zonular disruption	03	05%
Corneal opacity	03	05%
Old RD	06	10%

Associated ocular injuries Associated ocular injuries go long way in determining the ultimate visual prognosis in cases of traumatic cataract. Corneal and iris injuries were the most common associated injury.

Table 6: Type of Surgery

Type of Surgery	No. of Eyes	Percentage
SICS with PCIOL	54	90%
SICS with ACIOL	03	5%

Lens extraction with Ant. vitrectomy	03	5%
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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.^[10] 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.^[11] 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.^[12]

Disruption of the lens fibers after blunt or penetrating ocular trauma commonly leads to a traumatic cataract.^[13] The traumatic mechanism and the integrity of the capsular bag dictate the morphology of the cataract and the clinical course.^[14] Trauma disrupts and injures the lens fibers, leading to lens swelling.^[15] 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.^[16] Traumatic cataracts typically present as rosette or stellate subtypes.^[17]

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.^[18] 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.^[20, 21]

CONCLUSION

In our study males were predominantly affected by traumatic cataract because of their nature of work and outdoor occupation. The age group of 5-25 years formed the core group of people to get traumatic cataract. Though, in our study most of the patient were fitted with PCIOL and one with ACIOL, newer surgical techniques like PCIOL with capsular tension ring and sclera fixation IOL and other newer technique can be done in complicated cases like zonular dehiscence and/or posterior capsular rupture. The final visual outcome showed good result however the final visual outcome depends upon the extent of associated ocular injuries. Effective Intervention and management are the key points in preventing monocular blindness due to traumatic cataract.

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