

# Factors affecting visual outcome in traumatic cataract and its associated ocular injuries - A hospital based study

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## Abstract

**Background:** Ocular trauma is a major cause of visual impairment throughout the world, although little is known about the factors that affect the visual outcome in traumatic cataract in developing countries. **Aims and Objectives:** To find out the associated ocular injuries and the factors affecting final visual outcome of patients with traumatic cataract. **Material Methods:** This prospective hospital based study was conducted on 40 patients of traumatic cataract. Patients were managed with lens extraction and intraocular lens implantation. Regular follow up of patients was done and best corrected visual acuity and post operative complications were assessed at the end of six months. **Results:** Our study showed that majority (50%) of patients were in the age group of < 20 years with male preponderance. visual outcome was significantly better in younger age group (< 20 yrs) than the older group (> 20 yrs) ( p = 0 .03). There was no significant difference in final visual outcome of traumatic cataracts caused by penetrating or blunt trauma ( p = 0.73). Corneal tear was most common associated ocular damage followed by uveitis, lens matter in anterior chamber. **Conclusions:** Age of the patient affects final visual outcome after surgical treatment of traumatic cataract but type of trauma (blunt / penetrating) had no significant effect on final visual outcome. Corneal tear was most common associated ocular damage.

**Keywords:-** Traumatic cataract, Visual Outcome, Best Corrected Visual Acuity, Ocular trauma.

## Introduction

Ocular trauma is a major cause of monocular blindness and visual impairment throughout the world, although little is known about its epidemiology or associated visual outcome in developing countries [1]. Traumatic cataract is very common sequel of ocular trauma [2]. It may occur when natural lens is damaged either by a blunt or penetrating injury. The methods used to evaluate the visual outcome in eyes managed for traumatic cataracts and senile cataracts are similar [3], but the damage to other ocular tissues due to trauma may compromise the visual gain in eyes operated on for traumatic cataracts. Postoperative inflammation and corneal scar are common complication following traumatic cataracts, hampering visual outcome [4,5,6,7,8]. Other complications leading to decreased post operative vision are, secondary glaucoma,

pupillary capture, posterior capsular opacification and retinal scar [4]. The aim of this study was to find out the associated ocular injuries and visual outcome of patients with traumatic cataract along with their demographic features and modes of trauma.

## Aims and objectives

The aim of this study was to find out the associated ocular injuries and the factors affecting final visual outcome of patients with traumatic cataract.

## Material and Methods

This prospective study was carried out in the Department of Ophthalmology Government Medical College, Jammu. A comprehensive proforma was designed for this study. The study was conducted on patients of traumatic cataract as a result of ocular injury from blunt or penetrating trauma admitted in the

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department. Patients who gave consent and were cooperative and willing for the surgery were included. Personal information of all the patients was recorded. After admission to the hospital, detailed history was taken with particular reference to age, sex, and mode of injury, causes and activity at the time of injury. Preoperative assessment included: Best corrected visual acuity (BCVA) by snellen test-type, extraocular movements, fixation preferences, pupillary reflexes, slit lamp biomicroscopy of the anterior segment, applanation tonometry, dilated refraction, fundus examination with indirect ophthalmoscope. X-ray orbit was done to rule out any intra ocular radio opaque foreign body and B-scan when the optical medium was not clear enough to evaluate the posterior segment. Keratometry (Opposite normal eye was used in case of corneal surface irregularities), Intraocular lens power calculation and other relevant examinations and routine investigations were also done as well before surgery. All cases were subjected to surgery under local or general anaesthesia. The standard surgical procedure performed was SICS with posterior chamber IOL implantation, primary lens aspiration at the time of wound repair with primary or secondary IOL implantation. These surgical procedures were combined

with other surgical procedures depending upon the need in individual cases. Post-operatively all patients were treated with topical steroids along with topical antibiotics and non steroidal anti-inflammatory drugs. Steroids were gradually tapered over next six weeks to two months. Patients were discharged with topical antibiotics, steroids and topical cycloplegics. Patients were called for regular follow up after three days, then once a week for next six weeks, monthly for next three months and thereafter, every three months. On follow up, visual acuity, IOP recordings, detailed slit lamp biomicroscopy to rule out any uveitis, intraocular lens decentration, synechiae, pupillary capture and posterior capsular opacification were done. Posterior segment evaluation was done with indirect ophthalmoscopy. This study was in accordance with the ethical standards of Declaration of Helsinki and was approved by the Ethical committee of the institution. A written informed consent was taken from all the participants. Forty cases that were admitted our institution were studied over a period of one and half year. Data was analysed by using Statistical Package of Social Sciences (SPSS) 12. Appropriate statistical tests were applied. All p-values in our study were two tailed and a value of <0.05 was taken as statistically significant.

## Results

In the present study of 40 cases of traumatic cataract, demographic, etiological factors, type of trauma, morphology, associated ocular injuries, pre operative visual acuity, type of surgery and their role in post operative best corrected visual acuity and complications were assessed and analyzed. The age group ranged from 5 to 60 years. 50% cases were found in the age group of 5-20 years followed by 32.5% in age group 21-40 years and 17.5% in the age group > 40 years. In the present study, out of 40 cases, 30 (75%) were males and 10 (25%) were females. The male female ratio was 3:1. Twenty five cases (62.5%) had traumatic cataract due to penetrating trauma and 15 (37.5%) patients had traumatic cataract due to blunt trauma. Out of 40 cases of traumatic cataract, 24 cases (60%) had injury by wooden particles like stick, thorn and bow arrow. Metallic agents like iron rod, wire compass were responsible in 4 cases (10%). Penetrating injury by stone was seen in 2 cases (5%) and with glass piece in 4 (10%) cases, rest by fire cracker, cricket ball and burst carbonated bottle. Maximum numbers of injuries were found to be related to agricultural and domestic activities like cutting of wood followed by thorn and iron wire {20 cases (50%)}. Industrial related activities were seen in 4 (10%) cases. Iron was the most common etiological factor. Sports related activities like cricket ball, bow arrow and fire cracker were type of activity in 11(27.5%) cases and school related in 3 (7.5%) cases. Maximum number of cases (60%) was operated within the first three months following trauma. Only 10% cases presented more than 18<sup>th</sup> months after trauma. Best Corrected Visual Acuity (BCVA) at the time of presentation is shown in Table 1. Traumatic cataract was associated with injuries to the other ocular structures as well like corneal tear in 25 (62.5%) cases, uveitis in 11(27.5%) cases. Lens matter in anterior chamber was seen in 9 cases (22.5%) [Table 2]. Almost all cases underwent cataract extraction by small incision cataract surgery with primary or secondary intraocular lens implantation but 3 cases remained aphake. Intraoperatively vitreous loss was seen in 3 cases (7.5%) and hyphema in 2 (5%) cases. Traumatic cataract extraction behaves differently as compared to otherwise normal cataract extraction and was associated with postoperative complications like Uveitis in 11 (27.5%) cases, Posterior Capsular Opacification (PCO) in 12 (30%), Corneal edema in 4 (10%), Macular edema 3(7.5%), increased IOP in 3 (7.5%) cases, Pupillary capture in 2 (5%) and Hyphema in 2 (5%) cases. Procedures like Nd-YAG laser capsulotomy was employed in the management of these post-operative complications. Final Best Corrected Visual acuity (BCVA) was assessed at the end of six months. Out of 40 cases, BCVA of 6/18-6/6 was seen in 28 cases (70%), BCVA of 6/36- 6/24 in 8 cases (20%) and 10% cases had BCVA equal to or less than 6/60[Table 3].

**Table 1: Best Corrected Visual Acuity (BCVA) at the time of presentation.**

Initial VA	Number of Cases - n (%)
>6/60	1(2.5)
1/60 – 6/60	10(25)
CF – ½ m	2(5)
HM	4(10)
PL/PR	23(57.5)
<b>Total</b>	<b>40(100)</b>

**Table 2: Associated ocular injuries.**

Associated ocular damage	Number of patients - n (%)
Corneal tear	25(62.5)
Increased IOP	6(15)
Uveitis	11(27.5)
Lens matter in AC	9(22.5)
Hyphema	3(7.5)
PC Rent	3(7.5)
Vitreous loss	3(7.5)

**Table 3: Final Best Corrected Visual Acuity (BCVA) at 6 months.**

Final BCVA	Number of eyes - n (%)
<3/60	1(2.5)
3/60-6/60	3(7.5)
6/36-6/24	8(20)
6/18-6/12	21(52.5)
6/9-6/6	7(17.5)
<b>Total</b>	<b>40(100)</b>

**Table 4: Effect of Age group on final visual outcome.**

Age	Final Visual Acuity (BCVA)			Total n (%)
	6/6 to 6/18 n (%)	6/24 to 6/60 n (%)	< 6/60 n (%)	
0-10	8	2	0	10 (25)
11-20	9	1	0	10 (25)
21-30	4	2	0	6 (15)
31-40	5	2	0	7 (17.5)
41-50	1	1	1	3 (7.5)
> 50	1	3	0	4 (10)
<b>Total</b>	<b>28 (70%)</b>	<b>11 (27.5%)</b>	<b>1 (2.5%)</b>	<b>40 (100)</b>

( $\chi^2 = 4.29$ ,  $p = 0.03$ )

**Table 5: Effect of type of trauma on final visual outcome.**

Type of injury	Final visual acuity (BCVA)			Total n (%)
Penetrating trauma	18	6	1	25 (62.5)
Blunt trauma	10	5	0	15 (37.5)
<b>Total</b>	<b>28 (70)</b>	<b>11(27.5)</b>	<b>1 (2.5)</b>	<b>40(100)</b>

Fisher's exact  $p = 0.73$

Effect of age on final visual outcome: Visual acuity more than 6/18 was taken as good vision, between 6/24-6/60 as fair, less than 6/60 as poor. In our study 50% of cases were below the age of 20 years, 85% of these had achieved good final visual outcome followed by cases in the age group of 21- 40, 69 % of which had achieved good final visual outcome followed by cases older than 40 years, 28.7% had achieved good final visual outcome [Table 4]. Statistical analysis has shown that visual outcome was significantly better in younger age group (< 20 yrs) than the older group (> 20 yrs) ( $\chi^2 = 4.29$ ,  $p = 0.03$ ).

Effect of type of trauma on final visual outcome: In our study 62.5 % cases had penetrating and 37.5% had blunt trauma. 72% of cases of traumatic cataract due to penetrating trauma had achieved good final visual outcome (>6/18) followed by 66.6% of cases of traumatic cataract due to blunt trauma had achieved good visual outcome (>6/18) [Table 5]. There was no significant difference in final visual outcome between penetrating and blunt trauma (Fischer's exact  $p = 0.73$ ).

## Discussion

Injury to the eye represents a major threat to vision and this may happen to any individual at any age in any work place. Ocular trauma often leads to traumatic cataract along with damage to other ocular structures. Electrophysiological [9] and radio-imaging [10-12] investigations are important tools for assessing comorbidities associated with an opaque cataractous lens. Factors affecting final visual outcome after traumatic cataract surgery would be useful for ophthalmologists in such cases. Traumatic cataract was managed with lens extraction and intraocular lens implantation. Our study showed that most cases (50%) of traumatic cataract were found in the younger age group (5-20 years) with male preponderance. Sethi et al. reported in their study that most of the patients affected were young patients and half of them were children [13]. Srivastava et al found in their study that males are more affected [14]. Other studies have also proved same findings [15-17]. In our study blunt trauma accounts for traumatic cataract in 37.5% and penetrating trauma in 62.5% of cases. Our results were consistent with the results obtained by Memon MN et al that penetrating trauma accounts for traumatic cataract in 68.3% [18], Synder A et al observed penetrating trauma in 78.6% of cases [19] and Staffieri SE et al observed 88% cases of traumatic cataract due to penetrating trauma [20] while Gogate P et al observed traumatic cataract in 48.8% of cases due to blunt trauma and 39% of cases due to sharp trauma [21]. In our study wooden material like stick, thorn was the major cause of traumatic cataract which matches closely with study of Memon MN et al [18] and Shah MA [22]. In our study 67.5% had total cataract which matches with study of Panda A et al which had 74% total cataract [23]. In our study soft cataract was noticed in 22.5% which is consistent with the study of Shah MA et al in their study showed 59.9% patients had white soft cataract with ruptured anterior capsule followed by 26.6% had total cataract [22]. In our study more than half of patients had pre-

treatment best corrected visual acuity of light perception only which is consistent with study of Ahmed N et al [24] where half of patients had visual acuity of hand movement and with study of Kumar S et al [25] where maximum patient had visual acuity of light perception only. In our study, Corneal tear was most common associated ocular damage followed by uveitis, lens matter in anterior chamber. Other studies also had corneal damage as most common associated ocular injury in ocular trauma cases [26]. In the present study, time interval between trauma and cataract surgery ranges from same day to 10 years. Maximum patients (60%) presented to the hospital and underwent cataract surgery within 3 months, 17.5% patients within 4-6 months, 10 % patients were operated upon after 18 months, 7.5% patients within 7-12 months followed by 5% within 13-18th months. One (2.5%) patient was operated for traumatic cataract 10 years after trauma while Eckstein M et al in their study showed time interval between injury and cataract surgery ranged from 1- 60 weeks with mean interval was 10.4 weeks [27]. In our study 92.5% patients were safely rehabilitated with IOL implantation which is consistent with the study of Panda A et al as they put IOL in 89.2% of patients [23] and Gogate P et al in 90.2% of patients [21]. In our study, BCVA of 6/18-6/6 was seen in 70% cases after surgical treatment, 6/36- 6/24 in 20% cases and 10% cases had BCVA equal to or less than 6/60. Sharma AK et al had 43.7% patients who had achieved visual acuity of >6/18 after surgery [26], Similarly Kumar S et al observed in their study that 50% of the cases had visual acuity better than 6/18 after surgery [25]. Stenberg et al reported that the initial visual acuity and patient age were predictors [28] and Shah M et al observed that patient age was a predictor, but the initial visual acuity was not [29]. In our study, we observed that patient's age affects final visual outcome after surgical treatment of traumatic cataract but type of trauma (blunt / penetrating) had no

significant effect on final visual outcome.

### Summary and Conclusion

Traumatic cataract resulting from ocular trauma is a common cause of ocular morbidity, especially in young population. Most of the injuries occur by wooden particles like stick or thorn. Most injuries were related to agricultural and domestic activities. Almost all patients were safely rehabilitated with cataract extraction and IOL implantation and patient's age affects final visual outcome after surgical treatment of traumatic cataract but type of trauma (blunt / penetrating) had no significant effect on final visual outcome. Corneal tear was the most common associated ocular damage followed by uveitis, lens matter in anterior chamber. We recommend use of protective glasses while doing agricultural or industrial work.

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**Permission from IRB:** Yes

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