

# Visual Outcome of Traumatic Cataract at a Tertiary Eye Care Centre in North India: A Prospective Study

ASHISH KUMAR SHARMA<sup>1</sup>, AHMAD NADEEM ASLAMI<sup>2</sup>, JAI PRAKASH SRIVASTAVA<sup>3</sup>, JAWED IQBAL<sup>4</sup>

## ABSTRACT

**Introduction:** One of the most common presentations of blunt and penetrating ocular trauma is traumatic cataract. It remains a significant cause of visual impairment and physical disability among adults and children. It is associated with various ocular injuries.

**Aim:** To evaluate the associated ocular injuries and final outcome of patients with traumatic cataract along with their demographic features and modes of trauma.

**Materials and Methods:** A prospective study done in Department of Ophthalmology in M.L.B. Medical college, Jhansi from February 2010 to July 2011. A total of 48 patients diagnosed as a case of traumatic cataract were subjected to a detailed history, systemic and local examination with relevant investigations. Medical or surgical managements were done accordingly. Patients were subsequently followed-up and visual acuity was recorded. Appropriate statistical tests were applied.

**Results:** A 54.2% patients sustained penetrating trauma while 45.8% got blunt injury. Out of total, 79% patients were males while 50% were less than 15 years of age. Causative agents were stone, wood items, stick, metal objects etc. Among blunt trauma cases, 64% of the patients had visual acuity <6/60 while among penetrating trauma cases nobody had acuity >6/18. Anterior segment was more involved as compared to posterior segment. A 38.5% patients had corneal opacity among penetrating injury patients. The interval between trauma and surgery was less than one month among 75% of patients. After three months of surgery, 43.7% patients had visual acuity of >6/18.

**Conclusion:** This study provides recent data of patients hospitalized after ocular trauma and diagnosed as a case of traumatic cataract. Traumatic cataract occurs mostly in younger males. Surgical intervention is necessary to improve visual outcome. Good visual outcome was obtained in nearly half of the patients. Traumatic cataract patients can have good visual outcome depending upon proper management.

**Keywords:** Best-corrected visual acuity (BCVA), Blunt injury, Penetrating injury

## INTRODUCTION

Ocular trauma is the leading cause of visual disability and blindness [1]. Traumatic cataract is very common sequel of ocular trauma [2]. Traumatic cataract remains an important cause of visual impairment and physical as well as vocational disability in spite of recent diagnostic and therapeutic advances. It may occur secondary to blunt or penetrating trauma. Some other rare causes are infrared energy (glass-blower's cataract), electric shock, ionizing radiation (X-rays) etc [3].

The pathophysiology of traumatic cataract is believed to involve direct rupture of capsule or coup, countercoup and equatorial expansion due to hydraulic forces transferring the energy of trauma to the opposite side of the eye. It can be accompanied by anterior and posterior segment abnormalities depending on the force of trauma and depth of globe penetration [4,5].

Traumatic cataract poses a significant medical and surgical challenge to an ophthalmologist. A detailed history, careful examination and a clear management plan can simplify these cases and provide the best possible visual outcome [6,7].

Traumatic cataract can be treated by primary removal. Although secondary removal can be applied for some patients. The benefits of secondary removal are improved visibility and less chance of postoperative complications [8].

A very little data exists about the traumatic cataract in these areas of Jhansi region of Uttar Pradesh, India. Keeping this in mind, we did this prospective study. 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.

## MATERIALS AND METHODS

The study was conducted in Department of Ophthalmology in M.L.B. Medical College, Jhansi. Our centre offers specialized care for patients of all ages with complicated ocular or orbital disease conditions. We have a 24 hour emergency ophthalmic services to treat minor as well as major ocular injuries. The patients who cannot get treatment from periphery of Jhansi usually are referred to our centre. This provides an ample opportunity to obtain comprehensive data on the various characteristics and visual outcomes of patients hospitalized for ocular trauma in Jhansi.

We conducted a single-centre, different surgeon and single observer prospective hospital based study. The study period was from February 2010 to July 2011. The study was conducted in all the patients of ocular injury from blunt and penetrating trauma admitted at indoor, either from OPD or from casualty, and diagnosed as a case of monocular traumatic cataract. Patients who gave consent and were cooperative and willing for the surgery were included. Exclusion criteria included patients with unsure history of trauma, extensive time (more than two months) of presentation, extensive ocular damage with traumatic removal of lens and patients having injury due to rare causes (electric shock, X-rays etc).

Personal information of all the patients was recorded. Preoperative assessment included detailed history including modes of injury and causative agents. General examination was done after history. After establishing the general condition of the patients we subjected them to detailed local examination which included: Best corrected visual acuity (BCVA), distant and near both, torch light and detailed slit lamp examination of the anterior segment, tonometry, dilated refraction, fundus examination with the direct and indirect ophthalmoscope (if indicated), keratometry (Opposite normal eye was used in case of

corneal opacification), Intraocular lens power calculation and B-scan was done. Other relevant examinations were also done and routine investigations were also done before surgery.

After establishing the general condition of the patients, we managed them by surgical procedure. Anatomical integrity of the globe was firstly restored wherever it got damaged and extra capsular cataract extraction (ECCE) with primary posterior chamber intraocular lens (PCIOL) implantation was done. In some patients ECCE with secondary PCIOL was done. In mild lenticular subluxation with partial zonulolysis ECCE with PCIOL implantation was done. A 6.0mm PMMA (Polymethylmethacrylate) rigid PCIOL was used in all the cases. In marked lenticular subluxation with more than half of zonulolysis intra capsule cataract extraction (ICCE) with anterior vitrectomy with possible ACIOL implantation was done.

In cases of posterior capsule rupture (preoperative) ECCE with anterior vitrectomy with possible positioning of the IOL within sulcus was done. Support of large anterior capsule flap can also be availed in placing the IOL in such cases. Patients were subsequently followed-up on day one, after one week and three months postoperatively. At each follow-up visit patient's visual acuity was recorded and patients were examined in detail for any postoperative complications. Final best corrected visual acuity was recorded on the last postoperative visit i.e. at 3 months. Other examinations like slit lamp examination, funduscopy was also performed at each visit. Postoperative complications were managed accordingly, as early as they were diagnosed.

The study was registered with the institutional review board and ethical clearance was obtained by the institute ethical committee. Informed, written or oral consent was given by the patients. Informed, written or oral consent was also given by care givers or guardians on behalf of minors who were involved in the study. Study data was entered in MS excel 2007 and analysed by using Statistical Package of Social Sciences (SPSS) 12. Appropriate statistical tests were applied. The Chi-square test was applied. All p-values in our study was two sided and a value of <0.05 was taken as statistically significant.

## RESULTS

A total of 48 patients were included in the study. A 54.2% patients sustained penetrating trauma while 45.8% were inflicted with blunt injury. Out of 48 patients, 38 (79%) were males and 10 (21%) were females giving a male to female ratio of 3.8:1 [Table/Fig-1]. According to mode of injury, penetrating trauma was more common among males (57.9% vs 42.1%) while blunt trauma was more prevalent among females (60% vs 40%) although the difference is not significant. A total of 50% patients of traumatic cataract were less than fifteen years of age. Among patients less than fifteen years of age, penetrating trauma was significantly more common (75% vs 25%) but in higher age group (>15 years) patients blunt trauma was more common. This difference was significant.

The causative agents were more or less common such as stone, wood items, stick, metal objects etc. The most common cause for blunt injury is stone while the most common cause for penetrating injury is thorns.

Variable	Type of trauma		Total	Statistics
	Blunt	Penetrating		
Sex	n (%)	n (%)	N	$\chi^2 = 1.02$ df=1 p=0.312
Males	16 (42.1)	22 (57.9)	38	
Females	6 (60.0)	4 (40.0)	10	
Total	22 (45.8)	26 (54.2)	48	
Age Group				
≤ 15 years	6 (25.0)	18 (75.0)	24	$\chi^2 = 8.69$ df= 2 p=0.012
16-25 years	8 (72.7)	3 (27.3)	11	
> 25 years	8 (61.5)	5 (38.5)	13	

[Table/Fig-1]: Sex and age group distribution of cases according to mode of injury.

Variable	Type of trauma		Total (N=48)
	Blunt (N=22)	Penetrating (N=26)	
BCVA	n (%)	n (%)	N (%)
PR Defective	2 (9.1)	6 (23.1)	8 (16.7)
< 6/60	14 (63.6)	14 (53.8)	28 (58.3)
6/60 – 6/24	4 (18.2)	1 (3.8)	5 (10.4)
>6/18	2 (9.1)	0 (0)	2 (4.2)
Could not be assessed	0 (0)	5 (19.2)	5 (10.4)

[Table/Fig-2]: Incidence of BCVA on admission.

Associated Ocular Injury	Blunt (n=22)	Penetrating (n=26)	p
	Nos. of eyes (%)	Nos. of eyes (%)	
Nature of Anterior Segment involvement			
Corneal Opacity	2 (9.1)	10 (38.5)	0.042*
Corneal edema	4 (18.2)	3 (11.5)	0.687
Keratitis	4 (18.2)	3 (11.5)	0.687
Corneal perforation	0 (0)	23 (88.5)	<0.00001*
Uveal prolapse	0 (0)	8 (30.8)	0.005*
Hypaema	3 (13.6)	5 (19.2)	0.710
Vitreous in AC	0 (0)	2 (7.7)	0.492
Iridocyclitis	5 (22.7)	15 (57.7)	0.019*
Ant. & post. Synaechia	1 (4.5)	9 (34.6)	0.013*
Increased IOP	8 (36.36)	0 (0)	<0.00007*
Traumatic mydriasis	3 (13.6)	0 (0)	0.089
Subluxation of lens	5 (22.7)	2 (7.7)	0.222
Ant. & post. Cap. rupture	3 (13.6)	6 (23.1)	0.478
Nature of Posterior Segment involvement			
Vitreous Haemorrhage	2 (9.1)	4 (15.4)	0.673
Retinal detachment	3 (13.6)	5 (19.2)	0.710

[Table/Fig-3]: Incidence of associated ocular injury in blunt and penetrating trauma. \* Significant

Time elapsed	Blunt	Penetrating	Total	Statistics
	N (%)	N (%)		
< 1 months	20 (55.6)	16 (44.4)	36	$\chi^2 = 5.48$ ; df = 1; p=0.019
1-6 months	2 (16.7)	10 (83.3)	12	

[Table/Fig-4]: Incidence of time elapses between trauma and cataract surgery.

[Table/Fig-2] shows corrected visual acuity on admission in case of blunt and penetrating trauma. Out of 22 blunt trauma cases, 9.1% had perception of light, 64% of the patients had visual acuity <6/60 while only 9% had acuity >6/18. Out of 26 penetrating trauma cases, 54% of the patients had visual acuity <6/60 while nobody had acuity >6/18. The visual acuity of 5 (19%) patients could not be assessed.

According to type of cataract, total cataract was the most common type (92%) while other types (rosette, absorbed lens matter, calcified and posterior subcapsular) were evenly distributed with 2% cases each. There were many associated ocular injuries among patients of traumatic cataract in our study.

[Table/Fig-3] Anterior segment was more involved as compared to posterior segment. Corneal opacity was seen more (38.5%) among penetrating trauma patients than blunt trauma patients and the difference is statistically significant. Corneal perforation and uveal prolapsed was seen only among penetrating trauma cases. A 38.1% of the blunt trauma cases had increased IOP. Vitreous haemorrhage and retinal detachment was more common for penetrating injury.

The interval between trauma and surgery was less than one month among 75% (36) of patients while 25% patients had surgery within six months [Table/Fig-4]. We can see that more (55.6%) patients who had blunt trauma were operated within one month as compared to those who had penetrating injury. The delay in surgery was more

Variable	Type of trauma		Total N = 48
	Blunt (N=22)	Penetrating (N=26)	
BCVA	n (%)	n (%)	n (%)
< 6/60	2 (9.1)	10 (38.5)	12 (25.0)
6/60 – 6/24	4 (18.2)	8 (30.8)	12 (25.0)
>6/18	16 (72.7)	5 (19.2)	21 (43.7)
Could not be assessed	0 (0)	3 (11.5)	3 (6.3)

**[Table/Fig-5]:** Results of final corrected Visual acuity at 12 weeks.

common in penetrating trauma. All these differences are statistically significant.

The outcome of surgery is evaluated by calculating the final corrected visual acuity [Table/Fig-5]. A 43.7% patients had visual acuity of >6/18. Visual acuity could not be assessed among 3 (6.3%) patients while 25% still had acuity <6/60. Better results were seen in case of blunt injury patients as compared to penetrating injury patients.

## DISCUSSION

This study included 48 cases of traumatic cataract treated in the Department of Ophthalmology, M.L.B. Medical College, Jhansi. 54.2% patients sustained penetrating trauma. Daljit Singh et al., in their study reported that half of the trauma cases sustained penetrating injuries [9]. Male preponderance was found. It can be due to involvement of males in sports and outdoor activities. Srivastava et al., also found in their study that males are more affected [10]. Other studies have also proved same findings [11-14].

Half of the patients were less than 15 years of age. Sethi et al., reported in their study that most of the patients affected were young patients and half of them were children [15]. Among younger patients less than fifteen years of age, penetrating trauma was more common but in higher age group (>15 years) patients blunt trauma was more common.

The most common cause for blunt injury is stone while the most common cause for penetrating injury is thorns. Although Tewari et al., and Krishnan et al., reported stick as the commonest agent for injury to eyes [16,17]. On admission, out of 22 blunt trauma cases, 64% of the patients had visual acuity <6/60 while only 9% had acuity >6/18. Out of 26 penetrating trauma cases, 54% of the patients had visual acuity <6/60 while nobody had acuity >6/18. The visual acuity of 5 (19%) patients could not be assessed.

Corneal involvement was most common associated ocular damage. Other studies also give corneal damage as most common associated ocular injury in ocular trauma cases [18].

Our study revealed that satisfactory visual outcome in most of the patients with traumatic cataract could be achieved after cataract removal and intraocular lens implantation. Most of the patients had their surgery done within one month. Memon et al., found in their study that the duration between the trauma and corrective surgery was less than one month in 42% of cases [19]. Jagannath C et al., found that in 52% patients, the time lag between injury and surgery was within a month while it was more than 6 months in 12.5% patients [20].

Patients of blunt trauma were operated early as compared to those who had penetrating injury. After surgery, 43.7% patients had visual acuity of >6/18. Kumar et al., observed in their study that 50% of the cases had visual acuity better than 6/18 after surgery [21]. Other studies have also shown similar results in cases of traumatic cataract although a comparison of outcome between blunt and penetrating was not done [22-24].

Kalyanpad PN and Shinde CA found in their study that phacoemulsification with PCIOL is also an important modality of treatment in traumatic cataract [25]. We could not utilize this method

in absence of facility in our centre. Although, our success is very much comparable to their study.

Visual outcome was better in blunt trauma cases. It may be due to a more number of capsular bag fixations of intraocular lens and a lesser number of postoperative complications. Brar et al., have reported a visual acuity of 20/40 in 39% eyes in penetrating trauma compared to 87% in blunt trauma after surgery [26].

## LIMITATION

A major limitation of this study is a small sample size and a fixed follow-up period. This study was conducted at a medical college hospital where most of the complicated cases were presented. It also affected surgical success rates and final visual outcome. A majority of patients were from rural areas and seen by either local doctors or quacks postoperatively for their own convenience that limited the follow-up period.

## CONCLUSION

Most of the ocular trauma occurs in younger males of productive age groups. Penetrating injuries being more frequent than the blunt injury. Therapeutic and prognostic factors of visual acuity in cases of traumatic cataract are related to nature of anterior and posterior segment involvement, any pre-existing ocular conditions, timely and proper medical and surgical management of these cases, close follow up and management of post surgical complications.

Ocular trauma can be avoided employing some basic precautions. People should be made aware through media about the various complications of trauma in eyes. Emphasis needs to be laid on supervision of children activities and provision of child friendly play material. Once the injury has occurred, outcome depends upon extent of injury and professional approach must be taken to reduce complications.

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**PARTICULARS OF CONTRIBUTORS:**

1. Assistant Professor, Department of Ophthalmology, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India.
2. Assistant Professor, Department of Community Medicine, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India.
3. Senior Resident, Department of Ophthalmology, M.L.B. Medical College, Jhansi, UP, India.
4. Senior Resident, Department of Ophthalmology, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Ahmad Nadeem Aslami,  
Assistant Professor, Department of Community Medicine, Flat No. 24, Block C,  
Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar-821305, India.  
E-mail : ahmadnadeemaslami@gmail.com

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