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Original research article

A Study To Evaluate The Associated Ocular Injuries And Final Outcome Of Patients With Traumatic Cataract: A Multi-Centric Study

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Abstract

Aim: The aim of the present study is to evaluate the associated ocular injuries and final outcome of patients with traumatic cataract along with their demographic features and modes of trauma. **Methods:** The study was conducted in Department of Ophthalmology for the period of one year. A total of 40 patients were included in the study and these patients were divided equally into two groups as blunt and penetrating Injuries. The study was conducted in all the patients of ocular injury from blunt and penetrating trauma. **Inclusion Criteria:** All the patients who were admitted in the hospitals and diagnosed as a case of monocular traumatic cataract. **Results:** 50% patients sustained penetrating trauma while 50% were inflicted with blunt injury. Out of 40 patients, 21 were males and 19 were females. Out of 20 blunt trauma cases, 10% had perception of light, 60% of the patients had visual acuity <6/60 while only 10% had acuity >6/18. Out of 20 penetrating trauma cases, 50% of the patients had visual acuity <6/60 while nobody had acuity >6/18. The visual acuity of 4 (20%) patients could not be assessed. Corneal opacity was seen more 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 35% of the blunt trauma cases had increased IOP. Vitreous haemorrhage and retinal detachment was more common for penetrating injury. **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 are to be considered with high priority for better visual outcome.

Keywords: Visual outcome, management, traumatic cataract

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Introduction

Cataract remains the commonest cause of blindness in India contributing about 81%. The incidence of ocular injuries in India is estimated to be 20.5% with 75% cases occurring among those aged less than 40 years. Males are predominantly affected than females with a male to female ratio of 9:1. Further 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]. Cataract is the commonest complication following ocular injury [2]. Traumatic cataract results most commonly from either penetrating injuries from sharp objects like stick or thorn with direct injury to lens or through blunt trauma by objects like stone, cricket ball etc. Rarely, it can occur from electrical shock, ionizing radiation or infra-red rays (glass blower's cataract) [3].

Traumatic cataract following a perforating injury may be localized cataract, rosette cataract, intumescent cataract or lacerated cataract. Blunt trauma leads to concussion type of cataract due to coup or countercoup ocular injury. The lenticular opacity may be vossius ring, localized or diffuse type [4-7]. 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 [8, 9]. Traumatic cataract is a special clinical type since it is commonly seen in young individuals and in children. By causing severe visual impairment it leads to reduced productivity due to loss of manpower and in children it may lead to loss of binocular single vision if neglected.

Since traumatic cataract causes significant visual impairment in younger population, it is necessary to evaluate the damages caused by it and manage it with timely intervention to restore the vision at the earliest. 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 [10, 11]. The methods used to evaluate the visual outcome in eyes managed for traumatic cataracts and senile cataracts are similar [12] 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 aim of the present study was 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

The study was conducted in Department of Ophthalmology for the period of one year. In multiple hospitals. A total of 40 patients were included in the study and these patients were divided equally into two groups as blunt and penetrating. The study was conducted in all the patients of ocular injury from blunt and penetrating trauma

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admitted to hospitals 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 opthalmoscope (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, fundoscopy was also performed at each visit. Postoperative complications were managed accordingly, as early as they were diagnosed.

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) 24. Appropriate statistical tests were applied. The Chi-square test was applied. All p-values in our study were two sided and a value of <0.05 was taken as statistically significant.

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Results

Table 1: Gender and age group distribution of cases according to mode of injury

Variable	Type of trauma		Total	P value
	Blunt	Penetrating		
Sex	**n (%)**	**n (%)**	**N**	
Males	12 (60)	9 (45)	21	0.316
Females	8 (40)	11 (55)	19	
Total	20	20	40	
Age Group				
≤15 years	5 (25)	13 (65)	18	0.012
16-25 years	10 (50)	4 (20)	14	
> 25 years	5 (25)	3 (15)	8	

50% patients sustained penetrating trauma while 50% were inflicted with blunt injury. Out of 40 patients, 21 were males and 19 were females.

Table 2: Incidence of BCVA on admission

Variable	Type of trauma		Total (N=40)
	Blunt (N=20)	Penetrating (N=20)	
BCVA	n (%)	n (%)	N
PR Defective	2 (10)	4 (20)	6
< 6/60	12 (60)	10 (50)	22
6/60-6/24	4 (20)	1 (5)	5
>6/18	2 (10)	0 (0)	2
Could not be assessed	0 (0)	4 (20)	4

Out of 20 blunt trauma cases, 10% had perception of light, 60% of the patients had visual acuity <6/60 while only 10% had acuity >6/18. Out of 20 penetrating trauma cases, 50% of the patients had visual acuity <6/60 while nobody had acuity >6/18. The visual acuity of 4 (20%) patients could not be assessed.

Table 3: Incidence of associated ocular injury in blunt and penetrating trauma

Associated Ocular Injury	Blunt (n=20)	Penetrating (n=20)	p
	No. of eyes (%)	No. of eyes (%)	
Nature of Anterior Segment involvement			
Corneal Opacity	2 (10)	7 (35)	0.040
Corneal edema	4 (20)	2 (10)	0.674
Keratitis	4 (20)	2 (10)	0.684
Corneal perforation	0 (0)	18 (90)	<0.00001
Uveal prolapse	0 (0)	6 (30)	0.007
Hyphaema	3 (15)	4 (20)	0.733

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Vitreous in AC	0 (0)	2 (7.7)	0.432
Iridocyclitis	5 (25)	11 (55)	0.018
Ant. & post. Synaechia	1 (4.5)	9 (34.6)	0.012
Increased IOP	7 (35)	0 (0)	<0.00007
Traumatic mydriasis	3 (15)	0 (0)	0.088
Subluxation of lens	4 (20)	2 (7.7)	0.222
Ant. & post. Cap. rupture	3 (15)	5 (25)	0.478
Nature of Posterior Segment involvement			
Vitreous Haemorrhage	2 (10)	3 (15)	0.673
Retinal detachment	3 (15)	4 (20)	0.710

Corneal opacity was seen more 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 35% of the blunt trauma cases had increased IOP. Vitreous haemorrhage and retinal detachment was more common for penetrating injury.

Table 4: Incidence of time elapses between trauma and cataract surgery

Time elapsed	**Blunt**	**Penetrating**	**Total**	**P Value**
	N (%)	**N (%)**		
< 1 months	17 (85)	14 (70)	31	0.016
1-6 months	3 (15)	6 (30)	9	

We noticed that more patients who had blunt trauma were operated within one month as compared to those who had penetrating injury.

Table 5: Results of final corrected Visual acuity at 12 weeks

Variable	**Type of trauma**		**Total N = 40**
	Blunt (N=22)	**Penetrating (N=26)**	
BCVA	n (%)	n (%)	n
< 6/60	2 (10)	8 (40)	10
6/60 – 6/24	4 (20)	6 (30)	10
>6/18	14 (70)	4 (20)	18
Could not be assessed	0 (0)	2 (10)	2

18 patients had visual acuity of >6/18. Visual acuity could not be assessed among 3 patients while 12 patients still had acuity <6/60. Better results were seen in case of blunt injury patients as compared to penetrating injury patients.

Discussion

Ocular trauma is the leading cause of visual disability and blindness [14]. Traumatic cataract is very common sequel of ocular trauma [15]. Traumatic cataract remains an important cause of visual impairment and physical as well as vocational disability in

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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. [16]

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 [17, 18]. A 50% patients sustained penetrating trauma while 50% were inflicted with blunt injury. Out of 40 patients, 21 were males and 19 were females. Sethi *et al.* [19], reported in their study that most of the patients affected were young patients and half of them were children. 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.

Out of 20 blunt trauma cases, 10% had perception of light, 60% of the patients had visual acuity <6/60 while only 10% had acuity >6/18. Out of 20 penetrating trauma cases, 50% of the patients had visual acuity <6/60 while nobody had acuity >6/18. The visual acuity of 4 (20%) patients could not be assessed. Corneal opacity was seen more 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 35% of the blunt trauma cases had increased IOP. Vitreous haemorrhage and retinal detachment was more common for penetrating injury. Memon *et al.* [20] found in their study that the duration between the trauma and corrective surgery was less than one month in 42% of cases. Jagannath C *et al.* [21] 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.

We noticed that more patients who had blunt trauma were operated within one month as compared to those who had penetrating injury. 18 patients had visual acuity of >6/18. Visual acuity could not be assessed among 3 patients while 12 patients still had acuity <6/60. Better results were seen in case of blunt injury patients as compared to penetrating injury patients. Kalyanpad PN and Shinde CA *et al.* [22] found in their study that phacoemulsification with PCIOL is also an important modality of treatment in traumatic cataract [22]. 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.* [23] have reported a visual acuity of 20/40 in 39% eyes in penetrating trauma compared to 87% in blunt trauma after surgery.

Conclusion

Most of the ocular trauma occurred 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,

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outcome depends upon extent of injury and professional approach must be taken into consideration to reduce complications.

Conflict of Interest

None to be declared.

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