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Original Article

Visual Outcome After Cataract Extraction in Open Globe Injury

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ABSTRACT

Background: *Penetrating ocular trauma is a well-known cause of visual impairment in young adults and children. Cataract is the commonest complication following ocular injury.*
Aims: The findings of the present study are expected to help in appropriate management of traumatic cataract cases.
Materials & Methods: *This is a prospective study of 5yrs in patients of penetrating ocular trauma. Detailed history and full ophthalmic evaluation of patients was done. Most patients were operated 15 days after trauma, so inflammation gets settled. Self-sealing 2.8mm incision was made and capsulorhexis was tried and cortical aspiration was done. Children less than 12 yrs posterior capsulorhexis and anterior vitrectomy was done. If posterior capsule is tom, we tried to convert the tear in posterior capsulorhexis and anterior vitrectomy was done. Three piece and single piece lens were implanted depending upon status of capsular bag. Statistical analysis used: SSPE software*
Results: Males(63.9%) and 11-30 yrs(46.1%) *age group constitute majority. Common causes of injury in children(<10years), young (11-30years) and adult (31-50 years) were wooden stick (40%), thorn (44%) and iron flying object and knife/sharp instruments(42.5%) used in household respectively. Anterior capsulorhexis was done in 15% of patient and posterior chamber lens were implanted in 97% of patients. The visual acuity at presentation was 'the perception of light to 3mfc ' in 80.0% of cases while after surgery, it was found that 82.0% of patients had regained useful vision.*
Conclusion: *ocular trauma, penetrating injury, traumatic cataract.*

Key words: *obesity, overweight, schoolchildren*

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INTRODUCTION

The incidence of eye injuries is increasing, in spite of the fact that they are well protected.[1]

Reports suggest that up to 60.5%of cases of ocular injury lead to significant visual loss with higher rates among men under age of 30 years.[2] Incidence of penetrating injury in India is around 10% of total globe injury.[3]

Penetrating injury can cause severe damage to the eye and so should be treated as *serious emergencies*.[4] Cataract is commonest complication following ocular injury.[5]

The findings of the present study are expected to help in appropriate management of traumatic cataract cases.

METHODS

After getting approval from hospital research committee we started prospective study in 2010. Patients coming to our hospital between January 2010 to December 2015 with corneal tear and anterior capsule tear were enrolled in our study after obtaining their consent.

Inclusion criteria were corneal tear leaking or self-sealed with anterior capsule tear and cataract formation, Posterior capsular tear with anterior capsule tear and subluxated lens.

Exclusion criteria were scleral tear associated with corneal injury, other systemic serious injury and previous ocular interventions.

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We obtained detail history regarding age, sex, object causing injury, time of injury, signs and events after injury. Visual acuity was checked using Snellen's chart, Slit lamp examination was done for anterior segment examination, for posterior segment examination 78D and 90D was used if media was clear and b-scan examination in other cases.

Cornea tear was classified into leaking or self-sealed with or without uveal tissue prolapse. Leaking corneal tear with uveal tissue prolapse was repaired as primary treatment. Anterior capsule tear was evaluated to note extend, margins and location. Position of lens and Cataract was evaluated. Inflammation in anterior chamber and presence of infection was specially looked for. B scan to rule out posterior capsule tear, vitreous haemorrhage, retinal detachment and other posterior segment pathology was done.

Keratometry was done of same eye if central visual axis was clear otherwise other eye keratometry readings were taken. Biometry was done with immersion method of the same eye. Children IOL power was calculated by taking age into consideration. Cases were operated after 15 days of trauma except few with uncontrolled infection and glaucoma.

Anterior capsulorhexis was tried after staining with trypan blue dye to note the extension of capsule tear. Phacoemulsification and unimanual or bimanual aspiration was used to remove cataractous lens. Posterior capsulorhexis and vitrectomy was performed in all children younger than 12 years to avoid chances of posterior capsular opacification. Lens was implanted after cataract surgery in sulcus if anterior capsulorhexis is not done. If tear margins were visible and it is possible to convert it into anterior capsulorhexis with intact posterior capsule then single piece lenses were implanted in the bag, otherwise three piece lenses were used. Patients were left aphakic when margin of anterior and posterior capsulorhexis was not visible.

Postoperatively all patients were started on cycloplegic and topical and systemic steroids. Patients were called for follow up on 24 hours, 3 days, and 1, 2, and 6 weeks. Best corrected visual acuity was given on 6 weeks. We used the Statistical Package for Social Studies (SPSS 15) to analyse the data. For long term follow-up we called patient weekly for 6 weeks, monthly for 3 months, and then every 3 months for 1 year

RESULTS

It was found that a large majority of the cases were aged less than 30 years (62%) and males constituted a higher proportion (64%) than females (36%) (Table 1).

Among children less than 10 yrs injury with wooden stick (including bow and arrow) constitute most common cause(40%)(Table 2 instruments causing injury)

Thorn injury constitute common cause in age group of 11-30 years (44%) whereas iron and knife/sharp instruments used in household constitute common cause in 31-50 years (42.5%).

In our study 38% of wound required suturing of corneal wound, while majority (62%) of wound were self-sealed due to valvular action or pluged with iris. 'White soft' type of cataract was the common form of cataract developed after ocular trauma (57%) while localised cataract was found 29% patients. Nearly all patients (96%) with penetrating injury had lens in its normal anatomical location. Posterior capsule tear was present in only 18% of cases while majority (82%) has intact posterior capsule. Infection was present in only 7% of open globe injury (Table 3 corneal wound integrity, type of cataract, lens position, post capsule tear and infection).

Most of cases (92%) were operated after 15 days of trauma except few with uncontrolled infection and glaucoma. (Table 4 duration between injury and cataract surgery)

Anterior capsulorhexis was possible in only 15% of patients. posterior chamber lens were implanted in 97% of patients. No ACIOL was implanted during the study. 92% of patients had three piece lens implanted and only 8% had single piece lens implantation. Lens were implanted in sulcus in 63% patients while only 37% lens were in the bag.(Table 5 intraoperative events)

The visual acuity at presentation was found to be 'the perception of light to 3mfc ' in 80.0% of cases. After the surgery, it was found that as much as 82.0% of patients had regained vision (visual acuity more than or equal to 6/60) while in 54% cases, the visual acuity ranged between 6/18 to 3/60. (Table 6Visual acuity at presentation and after surgery of traumatic cataract cases)

The most important causes for decreased post-operative visual acuity were found to be irregular astigmatism (41%), central corneal opacity (34%) and posterior capsular opacification (7%).Posterior segment complications were vitreous haemorrhage, retinal detachment and macular oedema, was present in 11.8% of patients. Pupillary capture of lens was found in 3.2% of cases (Table 7 cause of decreased final visual acuity)

Table 1: Age and gender at presentation of open globe injury

Age group(years)	number of patients	percentage
0—10	30	16.13%
11—20	41	22.04%
21—30	45	24.19%
31—40	30	16.13%
41—50	24	12.90%
51—60	16	8.60%
Total	186	99.99%
Gender		
Male	119	63.90%
Female	67	36.00%
total	186	99.90%

Table 2: Age and gender at presentation of open globe injury

Objects causing injury	Age (0-10)	Age (11—20)	Age (21-30)	Age (31—40)	Age (41—50)	Age (51-60)
wooden stick	12	7	4	3	4	4
sharp thorn	8	17	21	4	1	3
bench	1	1	0	1	0	0
fire cracker	0	7	6	3	0	0
bull horn	4	1	1	2	4	1
iron	0	0	3	7	4	0
Knife/sharp instruments	0	5	7	7	5	2
Nail	2	0	1	2	2	0
Pen/pencil	0	2	2	1	4	2
Unknown	3	1	0	0	0	4
total	30	41	45	30	24	16

DISCUSSION

Majority of injury (46.1%) in our study belongs to 11-30 yrs age group. Katry et al showed a mean age of presentation of 28 years.[6] A study in western India also found that 25.6% cases occurred in 11-20 years.[7] Socioeconomic factors may also have a role, as access to care may change with age. A visit to a clinic or hospital also requires taking time from work,

and a more socioeconomically stable individual is more capable of this.

Among children less than 10 years injury with stick is most common (40%). A south Indian study in children 0-15 yrs showed that Stick injuries were responsible for 28%, thorn injuries for 21%, and firecrackers for 5%.[8] Thorn injury is more common in young working population which may be attributed to greater outdoor and recreation activity as well as work pattern of young individuals. Playing with a cricket ball, toy guns, and fire-crackers (during the festival of Diwali) were the common causes of trauma while playing. Most of the children came from lower socio-economic strata and were thus more likely to be participating in some kind of agricultural activities and playing more outdoor sports .Older population takes precautions and are thus less injured.

Males more affected than female due to outdoor work and more chances of playing rough and contact and projectile sports.[6-7,9-11] Wos and Mirkiewicz-Sieradzka noted that a large proportion of the population with traumatic cataracts in their series was male.[11]In contrast, Baklouti et al. did not find a gender difference in traumatic cataracts in their study in Tunisia.[12]

Table 3: corneal wound integrity, type of cataract, lens position, post capsule tear and infection.

Presenting feature	Details	Number of patients	Percentage
Corneal wound integrity	sealed	115	61.80%
	leaking	71	38.10%
Type of cataract	whitesoft	106	56.90%
	membranous	26	13.90%
	localised	54	29.00%
Lens position	subluxated	8	4.30%
	in place	178	95.70%
Posterior capsule tear	present	34	18.20%
	absent	152	81.70%
	present	13	6.90%
	absent	173	93.00%

Table 4: Duration between injury and cataract surgery

Duration of surgery from injury		
0—15	15	8.1%
>15 days	171	91.9%

Table 5: Intraoperative events

Intraoperative events	Variables	Number of patients	Percentage
anterior capsulorhexis	possible	28	15%
	not possible	158	85%
lens implantation	PCIOL	180	97%
	aphakia	6	3%
type of lens implanted	three piece	140	92%
	single piece	13	8%
PCIOL position	sulcus	117	63%
	in bag	69	37%

In the current study, 'white soft' cataract with ruptured anterior capsule was most common
(57%). This was similar to Jagannath et al. study which showed incidence of white soft cataract to 47.5%.[13]

Most of cases were operated 15 days after trauma except infection and glaucoma patients, due to decrease in inflammatory response and fibrosis of tear margin giving a safety edge during surgery. Zhang et al. reported that the incidence of infection is higher if primary closure is late, although the incidence of infection did not vary significantly in our study.[14] Wos and Mirkiewicz-Sieradzka reported that the time interval between injury and intervention did not make a difference in terms of the final visual outcome.[11] We are not aware of a study that examined the time interval between injury and treatment start for traumatic cataracts.

Table 6: Visual acuity at presentation and after surgery of traumatic cataract cases

Visual acuity	Presentation	%	Final BCVA	Final %
6/12 TO 6/6	0	0%	52	27.90%
6/60 TO 6/18	15	8.10%	100	53.70%
3MFC TO 6/60	22	11.70%	15	8.10%
PL TO 3MFC	149	80.10%	15	8.10%
PL TO 3MFC	149	80.10%	15	8.10%
	186		186	

Table 7: Cause of decreased final visual acuity

Cause for decreased visual acuity		
posterior capsule opacification	13	6.9%
central corneal opacity	63	33.8%
irregular astigmatism	76	40.8%
posterior segment complication	22	11.8%
Pupillary capture	6	3.2%
Secondary glaucoma	1	0.5%

Only 13 patients (6.9%) had severe infection on presentation, which were referred to retinal surgeon for vitrectomy and only 4 patients of them (2.1%) had to be eviscerated due to endophthalmitis. Eviscerated patients had vitreous incarcerated in the wound and did not respond to any treatment. The reported incidence rate of endophthalmitis following open-globe injury ranges from 0 to 16.5%.[14]

Vision on presentation was poorer (80%) on presentation, which improved after surgery and stabilized at 6 wk post-operatively (82%). In majority of cases injury was limited to anterior chamber with good result after cataract surgery only. Krishnamachary, Rati and Gupta[15] and Srinivasan R Kumadhan et al[16] studies had found visual acuity of less than 6/60 to perception of hand movements or light perception in most of their cases. Shah et al[17] had found that 87.8% had preoperative visual acuity of less than 1/60. Gogateet al[7] had found that 51.2% had visual acuity of perception of light. Gradin and Yorston[18] defined excellent vision as 20/60 or better visual acuity at 4 weeks after cataract surgery and noted excellent vision in 108 (64.7%) of 215 eyes with traumatic cataracts. Loncar VL and Petric Ialso reported good visual outcome following surgical treatment for traumatic cataract.[19]

Anterior capsulorhexis was possible in only 15% of patients due to irregular cut edges and non-visibility of margin. Single piece lens (8%) was implanted in the bag when anterior capsulorhexis was performed and posterior capsule was intact. Three-piece posterior chamber intraocular lenses were implanted in majority (92%) of cases. In Blum et al study[20] posterior chamber intraocular lens was implanted in 67% of penetrating eyes injury patients. Our study had 97% rate of posterior chamber implantation due to more capsular stability as patients were operated 15 days after trauma. Similar to our study, Ram et al study[21] also reported lower incidence of capsular opacification following primary

posterior capsular opacity and anterior vitrectomy in paediatric patients.

Irregular astigmatism was the most common cause (40.8%) of decreased final visual acuity followed by central corneal opacity (33.8%). While secondary glaucoma was present in 1 patient for which trabeculectomy was performed twice and still uncontrolled on medication. Jagannath et al[13] in his study also found irregular astigmatism(27.5%) and corneal opacity (22.5%) as common cause of decreased postoperative visual acuity. Posterior capsular opacification may be present as cataract was operated in nearly young population in long run.

CONCLUSION

The traumatic cataract cases are predominantly common in young age group and males. Implantation is highly effective in restoring vision in traumatic cataract cases. There should be quick referral to the specialized ophthalmic care units depending on the condition of the patients. Following primary repair of any ocular injury, the final visual outcome in terms of traumatic cataracts may be better if treatment is delayed for two weeks. Preventive measures based on object causing injury should be taken to reduce the incidence of blinding trauma.

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