Research Article

Visual outcome in traumatic cataract in Kashmir

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Abstract

Background: The most common manifestation of ocular trauma is traumatic cataract, which remains a significant cause of visual impairment and physical disability in spite of diagnostic and therapeutic advances.

Objective: To assess visual outcome in case of traumatic cataract and various factors pre- and postoperatively affecting it.

Material and Methods: The study included 50 patients having traumatic cataract undergoing primary intraocular lens implantation. Personal information and history of the patient were recorded and detailed preoperative assessment was carried out. The surgeries performed were phacoemulsification and conventional extracapsular cataract extraction (ECCE) with lens implantation depending on preoperative status.

Results: A total of 50 patients aged 3–55 years with mean±SD 24.28±14.17 were studied. There were 38 (76%) males and 12 (24%) females; 26 (52%) had closed globe and 24 (48%) open globe injuries. Phacoemulsification was performed in 42 cases (84%) and conventional ECCE in the rest. Posterior chamber intraocular lens (PCIOL) was implanted in 49 cases (41 in bag and 8 in sulcus) and in 1 case anterior chamber intraocular lens was implanted. The most common age group to be affected was between 10 and 30 years (average 22.57 years). Wooden stick was the most common mode of injury (24%) followed by stone chip (20%). Type of cataract was found to be cortical (50%), posterior subcapsular (28%), and total (22%). Paracentral corneal opacity was the most common preoperative complication found in 30 cases (60%). Regarding postoperative visual acuity at 1 week, it was 6/6 in 8 (16%) cases, 6/18 to 6/36 in 24 (48%) cases, and ≤6/60 in 18 (36%) cases. There was absolute improvement in best-corrected visual acuity (BCVA) at 6 months, which was 6/6 to 6/12 in 33 (66%) cases, 6/18 to 6/36 in 16 (32%) cases, and ≤ 6/60 in 1 (2%) case only. On comparison *p*-value for both was found to be 0.000 (statistically significant). Closed globe injuries had better results than open globe type. Striate keratitis and posterior capsular opacification were the most common postoperative complications found in 20% cases each. Two patients (4%) developed amblyopia.

Conclusion: As youth and children are more prone to injury, adequate adult supervision and educational measures are necessary to reduce prevalence of these accidents. Phacoemulsification is the better surgery because of early refraction stabilization. PCIOL implantation in capsular bag has good results. Children <6 to 7 years should be treated promptly and as early as possible because of chances of developing amblyopia.

KEY WORDS: Traumatic cataract, posterior chamber intraocular lens (PCIOL), visual acuity (VA), phacoemulsification, best-corrected visual acuity (BCVA)

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Introduction

The most common manifestation of ocular trauma is traumatic cataract, which remains a significant cause of visual impairment and physical disability in spite of diagnostic and therapeutic advances. It occurs secondary to blunt or penetrating trauma. Infrared energy (glass–blower's cataract), electric shock, ionizing radiation (e.g. X-rays, g-rays) are other

rare causes.[1] Traumatic cataract has also been reported after vigorous ocular massage.[2]

The associated complications in conjunction with traumatic cataract which in turn have the effect on final visual outcome are lens subluxation/dislocation (most common), hyphema, glaucoma (phacolytic/phacomorphic/pupillary block/angle recession), phacoanaphylactic uveitis, retinal detachment, choroidal rupture, retrobulbar hemorrhage, traumatic optic neuropathy, globe rupture.

There are various types of lenticular opacities seen after ocular trauma such as Vossius ring opacity, subepithelial disseminated opacities, cob-web subcapsular opacities, traumatic rosette-shaped cataract, and total traumatic cataract.

Material and Methods

The study was conducted in the Department of Ophthalmology, Government Medical College, Srinagar. It was a single-centre, different Surgeon and single observer prospective study. The study was registered with the institutional review board and was approved by ethics committee of GMC, Srinagar.

The study was conducted on 50 patients having traumatic cataract undergoing primary posterior chamber intraocular lens (PCIOL) implantation. Each patient was followed up for a minimum of 6 months. Exclusion criteria included significant corneal opacification, large iridodialysis, raised IOP, and posterior segment involvement. Inclusion criteria included all open and closed globe injuries with traumatic cataract.

The personal information of all the patients was recorded and proper preoperative assessment, which included visual acuity, slit-lamp examination, tonometry, dilated refraction, fundoscopy, keratometry (opposite normal eye was used in case of corned opacification), IOL power calculation (using SRK–II formula), and B-scan, was carried out.

Patients were admitted 1 day before surgery. Antibiotic drops X QID were advised 3 days before surgery. Mydriatic eye drop 1% cyclopentolate HCl was instilled in the morning starting approximately 2 h before the surgery, one drop every 30 min. Surgeries were performed under local anesthesia or general anesthesia, depending on age. Fornix-based conjunctival flap was made in each case.

Phacoemulsification was performed in 42 case (84%) and conventional extracapsular cataract extraction (ECCE) in 8 cases (16%), depending on preoperative status. Endocapsular or ciliary sulcus fixation of PCIOL was done depending on condition of posterior capsule. In case of no posterior support, anterior chamber intraocular lens (ACIOL) was implanted whereas in case of posterior capsular (PC) rent, anterior vitrectomy was performed.

Patients were followed after 1 week, 1 month, 3 months, and 6 months, and during each follow–up, visual acuity, slit-lamp examination, fundoscopy, best-corrected visual acuity (BCVA) was performed. χ^2-Test was used for statistical analysis.

Table 1: Age distribution

Age (years)	Males, *n* (%)	Females, *n* (%)	Total, *n* (%)
≤10	7 (18.4)	4 (33.35)	11 (22)
11–20	10 (26.3)	4 (33.3)	14 (28)
21–30	11 (28.9)	1 (8.3)	12 (24)
31–40	4 (10.5)	3 (25)	7 (14)
>40	6 (15.8)	0 (0)	6 (12)

$p = 0.202$ (>0.05), not significant.

Table 2: Interval between injury and surgery

Gender	<1 Month	1–3 Months	4–12 Months	>1 Year
Male	4 (10.5%)	20 (52.6%)	5 (13.2%)	9 (23.7%)
Female	4 (33.3%)	1 (8.3%)	5 (41.7%)	2 (16.7%)
Total	8 (16%)	21 (42%)	10 (20%)	11 (22%)

Comparing average reporting time in males and females, $p = 0.011$ (not significant)

Results

The study included 50 patients having traumatic cataract aged between 3 and 55 years with mean ± SD 24.28 ± 14.70, out of which 38 (76%) were males with median age of 23.80 years and 12 (24%) were females with median age of 13.25 years. The incidence of trauma in males was maximum, 55.2% between 11 and 30 years of age whereas it was found that 66.6% of females with traumatic cataract were between 3 and 20 years. Overall age group up to 30 years was more prone to injuries (37 cases, 74%) [Table 1].

Both open and closed type injuries with traumatic cataract fulfilling the exclusion criteria were included in the study and comprised 26 cases (52%) and 24 cases (48%), respectively. Right eye was found to be affected in 23 cases (46%) and left eye in 27 cases (54%).

Type of surgery performed was phacoemulsification in 42 cases (84%) and conventional ECCE in 8 cases (16%), depending on preoperative status. PCIOL was implanted in 49 patients (98%), of which 40 were placed in the capsular bag and 9 in ciliary sulcus (where PC rent was present). ACIOL implantation was performed in one (2%) patient where there was no posterior support because of zonular dehiscence. The various observations made were as follows:

Of the patients, 42 (84%) reported the injury late, after 1 month [Table 2].

Wooden stick was the most common cause of injury followed by stone chip. Fists, sickle, concussion with elbow were also found in others [Table 3].

Cortical cataract was the most common type found in 25 (50%) cases followed by posterior subcapsular cataract in 14 (28%) and total cataract in 11 (22%) cases. Paracentral corneal opacity followed by torn or distorted pupil was the most common preoperative complication [Table 4].

Intraoperatively PC rent was found in 11 (22%) cases, of which 5 had inadvertent, 5 coexistent PC and AC rent, and

Table 3: Mode of injury

Cause of injury	Male	Female	Total	Percentage
Wooden stick	9	3	12	24
Stone chip	8	2	10	20
Cricket ball	4	0	4	8
Iron chip	2	2	4	8
Piece of glass	2	1	3	6
Fire cracker	2	0	2	4
Pencil	2	1	3	6
Hypodermic needle	1	1	2	4
Others	8	2	10	20

Table 4: Comparison of various preoperative complications in different studies (in %)

Preoperative complications	Our study	Bashir et al.[5]	Lacmanovic Loncar and Petric[7]
Paracentral corneal opacity	60	60	45.45
Adherent leukoma	6	24	27.27
Torn/Distorted pupil	30	26	18.18
Posterior synechiae	16	28	18
Anterior capsular rent	16	10	27.27
Zonular dehiscence	2	0	9

Table 5: Preoperative complications

Complications	*N* (%)
Paracentral corneal opacities	30 (60)
Adherent leukoma	3 (6)
Torn/Distorted pupil	15 (30)
Posterior synechiae	8 (16)
Anterior capsular rent	8 (16)
Zonular dehiscence	1 (2)

Table 6: Pre- and postoperative visual acuity

Visual Acuity (VA)	Preoperative, *N* (%)	Postoperative at 1 week, *N* (%)	BCVA at 6 months, *N* (%)
6/6 to 6/12	0 (0)	8 (16)	33 (66)
6/18 to 6/36	4 (8)	24 (48)	16 (32)
≤6/60	46 (92)	18 (36)	1 (2)

N, number of cases; BCVA, best-corrected visual acuity

Comparing VA at 1 week and 6 months, $p = 0.000$ (significant)

1 case of blunt trauma had isolated PC rent. There was vitreous loss in six cases in which vitrectomy was performed.

VA ≤6/60 was observed in 23 of 26 cases (88.5%) in open globe injury and 23 of 24 cases in closed globe injuries. The difference was insignificant ($p \geq 0.05$). Absolute improvement in VA score of 6/12 to 6/6 among the closed globe injury was observed in 19 (79.2%) patients and in 14 (53.8%) patients in open globe injury, which was insignificant ($p \geq 0.05$) Comparing VA at 1 week and 6 months, *p*-value was 0.000, which was statistically significant [Tables 5 and 6].

Table 7: Postoperative complications

Complications	Number (%)
Striate keratitis	10 (20.0)
Corneal edema	3 (6.0)
Fibrinous reaction	10 (20.0)
Posterior capsular opacification	10 (20.0)
Pupillary capture	4 (8.0)
Posterior synechiae	2 (4.0)
Decentration of IOL	6 (12.0)
Amblyopia	2 (4.0)
Secondary glaucoma	1 (2.0)

Table 8: Visual acuity in open/closed globe injury

		Mechanism of injury	
		Open, *N* (%)	Closed, *N* (%)
Pre-op. VA	≤6/60	23 (88.5)	23 (95.8)
	6/18 to 6/36	3 (11.5)	1 (4.2)
Post-op. VA	≤6/60	1 (3.8)	–
at 6 months	6/18 to 6/36	11 (42.3)	5 (20.8)
	6/6 to 6/12	14 (53.8)	19 (79.2)

VA ≤6/60 was seen in 23 of 26 cases (88.5%) in open globe injury and 23 out of 24 cases in closed globe injuries. The difference being insignificant ($p \geq 0.05$). Absolute improvement in VA score of 6/12 to 6/6 among the closed globe injury was observed in 19 (79.2%) patients and 14 (53.8%) patients in open globe injury, which was insignificant ($p \geq 0.05$).

Most common postoperative complications were striate keratitis, fibrinous reaction, and PC opacification [Table 7].

Cause of low vision of < 6/24 were PC opacification in three (6%), IOL decentration in two (4%), amblyopia in two (4%), and secondary glaucoma in one (2%) patient.

Discussion

In our study regarding sex distribution, male preponderance was seen—38 males (76%) out of 50 patients included in the study. It may be due to more number of males working outside their homes where they are more susceptible to injuries. This finding was consistent with the studies by Tetz and colleagues[3] and Synder et al.,[4] who reported 60% and 75% males, respectively.

Maximum cases were reported in the age group of 10–30 years, which is the most productive age group, with an average age of 22.57 years [Table 1]. Rozsival and Hakenova,[5] Kshetrapal and Kshetrapal,[6] and Lacmanovic Loncar et al.[7] reported average age to be 29, 28.23, and 25 years, respectively, in their studies, which is consistent with our study. With regard to the interval between injury and surgery, most of the patients reported late, with 11 (22%) patients reported after 1 year [Table 2]. This is because most of the patients were illiterate and from remote areas where they lack awareness and good medical facilities are not available.

Injuries were caused mechanically by different objects. The most common mode of injury was wooden stick (24%) followed by stone chip (20%) [Table 3]. The former was seen mostly in children while playing and latter in people involved with stone work. Ahmad et al.[8] reported the same in their study.

Regarding the type of cataract, cortical cataract was most commonly seen in 50% cases followed by posterior subcapsular cataract in 28% cases. Same association was reported by Wong et al.[9] However, Kuldeep et al.[10] reported total cataract in 80% of patients in 60 pediatric traumatic cataract patients, the reason being that in his study only pediatric age group was included. Various preoperative complications seen in our study were almost in accordance with other studies [Table 4].

Posterior capsular rent was seen intraoperatively in 11 patients (22%). PC had been breached by trauma in six (55%) cases. Out of these, five were associated with anterior capsular rents and there was one isolated PC rent. There were five (45%) inadvertent PC rents. Out of these, vitreous loss occurred in six patients and anterior vitrectomy was performed in these. Lacmanovic Loncar[7] in a cohort of 24 patients with traumatic cataract reported PC rent in 3 (12.5%) cases and Ahmad et al.[8] reported in five patients (10%), both results being consistent with our findings. Bowman et al.[11] in 72 cases of penetrating traumatic cataract reported PC rent in 31 (43.05%) cases, of which 27 (72.97%) were preexisting and 4 (26.03%) were intraoperative. This variability in the parameters is due to the absence of preexisting tears in first two studies and inclusion of only penetrating trauma in the latter.

In our study, we observed preoperative VA ≤6/60 in 46 patients (92%), 6/18 to 6/36 in 4 patients (8%), and none had VA ≥6/12. This is in accordance with the studies by Rozsival and Hakenova[5] and Kshetrapal and Kshetrapal[6] who reported preoperative VA ≤ 6/60 in 90.4% and 96%, 6/18 to 6/36 in 7.7% and 4%, and ≥ 6/12 in 1.9% and 0% patients, respectively. In the first postoperative period, uncorrected VA was ≥6/60 in 64% patients and ≤6/60 in the rest [Table 5]. This is because during this period, majority of the patients had anterior chamber cellular reaction, which subsided without any sequelae after treatment with intensive topical steroids and cycloplegics. Hu et al.[12] in a study of 142 patients reported VA ≥6/60 in 70% cases, which is consistent with our study. BCVA at 6 months was ≥6/12 in 66%, 6/18 to 6/36 in 32%, and ≤ 6/60 in 2% patients in our study. Nearly same was reported by Kshetrapal and Kshetrapal[6] and Ahmad et al.[8] However, Rozsival and Hakenova[5] and Synder et al.[4] reported postoperative BCVA ≤6/60 in 16.7% and 14.3% patients, respectively, which is quite higher than that observed in our study. This can be explained by posterior segment injury, which was excluded in our study. We observed preoperative VA ≤6/60 in 23 of 26 patients (88.5%) among the open globe injury and 23 of 24 patients (95.8%) among closed globe injury; the difference being insignificant ($p > 0.5$). The absolute improvement in acuity score of 6/6 to 6/12 was observed in 14 cases (53.8%) in open globe and 9 cases (79.2%) in closed globe injury; the difference being insignificant ($p > 0.05$) [Table 6]. These findings are in accordance with those reported by Baklouti et al.[13] and Brar et al.[14]

Among the postoperative complications [Table 7], incidence of striate keratitis was 20% in our study. Ahmad et al.[8] reported the incidence of 20%, Pasricha[15] 16.6%, and Ashish[16] in 12.5%. This variability in the incidence could be due to different surgical procedures in these studies. Corneal edema was found in three patients (6%), which is consistent with the incidence reported by Lacmanovic Loncar et al.[7] (8.22%) and Ahmad et al.[8] (6%). Fibrinous uveitis is a common postoperative complication especially in children, leading to posterior synechiae, pupillary block glaucoma, and lenticular membrane formation. It was found in 10 cases (20%) in our study, which is closer to incidence reported by Pasricha[15] (24%), Ashish[16] (25%), and Lacmanovic Loncar et al.[7] (20.88%). PC opacification mainly in children was a frequent late postoperative complication seen in 10 patients (20%), out of which 6 (12%) required Nd:YAG laser capsulotomy. This finding is consistent with findings of Lacmanovic Loncar et al.,[7] Ahmad et al.,[8] and Pasricha.[15] We found pupillary capture in four cases (8%). Gupta and Grover[17] reported in 9% cases, which is consistent with our finding. However, BenEzra et al.[18] and Eckstein et al.[19] reported pupillary capture in 26% and 35% cases, respectively, which is quite higher than that found in our study. This increased incidence in these studies is because these were carried out in pediatric age group only where postoperative inflammation is more and thus there are more chances of pupillary capture. Decentration of IOL was seen in six patients (12%) in our study, which is closer to that reported by Lacmanovic Loncar et al.[7] (12.5%) and *Gupta* and Grover[17] (9.0%). Amblyopia was seen in two patients (4%) in our study. Synder et al.[4] reported amblyopia in six cases (14.3%) of 42 cases studied; Gradin and Yorston[20] in 38.9% cases of 147 cases, which is quite higher compared to our study. This is because above studies included only pediatric age group, which are more susceptible to develop amblyopia. Only one patient (2%) developed secondary glaucoma in our study, which is same as reported by Chang.[21]

Conclusion

In our study, the most susceptible age group was between 10 and 30 years, which mostly comprised children and youth, with males predominating. Injuries were inflicted during playing and working. Thus, more adequate adult supervision and educational measures are necessary to reduce the prevalence of these accidents. The basic operation performed in most of the patients was phacoemulsification. These patients, when not associated with other preoperative complications, gained vision >6/12 in the first week postoperatively. So, phacoemulsification has the advantage of earlier refraction stabilization and less astigmatism.

In children <6–7 years of age, amblyopia developed if vision was not corrected promptly. Thus, in children, early visual rehabilitation by removal of cataractous lens with PCIOL implantation is necessary to avoid deprivation amblyopia. Type of lens that exerts pressure changes on ciliary body like sulcus fixated are to be avoided in children. Keeping this in mind, PCIOL implanted in capsular bag is better option in children. Second most common mode of injury after wooden stick was stone chip, which was found mostly in people involved in stone work who are poor and injury can affect them economically further. So, proper education should be given to them regarding protective measures to be taken during work.

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