ORIGINAL ARTICLE

VISUAL OUTCOME OF CATARACT SURGERY IN CASES OF PENETRATING OCULAR TRAUMA

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ABSTRACT

Background: The objective of this study was to determine the visual outcome after cataract surgery in patients with penetrating ocular trauma.

Material & Methods: It was a retrospective case series of 33 cases with traumatic cataracts underwent cataract surgery between 2009 and 2012 in a rural population of Gilgit, Pakistan. Pre and post operative complications and visual acuity was noted of all cases.

Results: Out of study subjects majority were male (91%) and the mean age was 26.8±6.2 years. In 91% cases initial best corrected visual acuity was not better than counting fingers. All patients underwent primary surgery. Posterior chamber intraocular lens implantation was safely achieved in 67% cases and a final visual acuity of 20/40 or better was obtained in 45% of eyes in our study. Preoperative and postoperative complications were also noted and their effect on final visual outcome was analyzed.

Conclusion: Good visual outcome was obtained in nearly half of the eyes in our study. The main anterior segment postoperative complications were posterior capsular opacification, corneal edema and wound leakage while retinal detachment, vitreous loss and endophthalmitis were the posterior segment complications.

KEYWORDS: Trauma; Cataract; Posterior chamber; Intraocular lens.

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INTRODUCTION

Ocular trauma is a major cause of visual loss worldwide.[1] At least 30% of penetrating traumas present with traumatic cataract and it is actually the most common complication of penetrating ocular injury which results in loss of vision. [2] The pathophysiology of a traumatic cataract is believed to involve direct capsular rupture or coup, countercoup and equatorial expansion. Coup is the direct injury whereas countercoup and equatorial expansion result from hydraulic forces within the eye transferring the energy of the trauma to the opposite side of the eye. Either or both of these mechanisms together, capsular rupture or lens epithelium damage, lead to progressive or instantaneous lens clouding. Accompanying the cataract can be both anterior and posterior segment abnormalities depending on the depth of globe penetration. The opaque lens interferes with the visual axis and usually requires removal. If the capsular bag is ruptured an anaphylactic fibrinous inflammation occurs which can lead to many devastating complications.[3,4]

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By Kuhn's standardized classification,[5] penetrating trauma is defined as laceration of the eyeball by a sharp object without an exit wound. 27% to 65% of penetrating trauma is prone to cataract formation[6] and the severity of associated damage to the eye can range from simple corneal puncture to a ruptured globe wound.

Surgical options for repair of penetrating injury depend on factors such as level of injury and surgeon's capabilities. Cataract extraction with implantation of a Posterior chamber intraocular lens (PCIOL) is a well-documented and well-established procedure for visual rehabilitation in cases of crystalline lens opacification.[4]

Little data exists about the outcome of traumatic cataract due to penetrating ocular trauma in the rural areas of Gilgit Baltistan province of Pakistan.

The objective of this study was to determine the visual outcome after cataract surgery in patients with penetrating ocular trauma in the rural areas of Northern Pakistan.

MATERIAL AND METHODS

This retrospective study was conducted at Gilgit Eye Hospital, Gilgit, between 2009 and 2012. Gilgit is situated amid the Hindu Kush, the Karakoram, and the Himalayas ranges of mountains with a total population of 1000,000.

We analyzed charts of 33 patient with acute traumatic cataracts due to penetrating injury. All patients had a monocular cataract with a history of trauma to the eye in the preceding hours or days. Patients with unsure history of trauma, extensive time to presentation (over 2 months), unavailable post-operative visual acuity (usually due to age limitations) or poor records were excluded from the study. Patients with traumatic removal of lens and obliteration of the anterior chamber were excluded from the study. Ruptured globes and those with retinal damage were included if cataract was evident. Age, sex, trauma type and time to surgery after trauma were recorded for all patients. Pre and post-operative visual acuity and complications were also noted at their return visits.

Eyes with penetrating injuries were taken to the Operation Theater shortly after presentation where the cornea was closed and cataract extracted by extra capsular cataract extraction (ECCE) i.e. primary repair, with or without implantation of a PCIOL. Lens cortex removal was done as completely as possible without endangering the integrity of the capsular bag enclosing the lens remnants (if a capsular bag was present). A manual irrigation/aspiration system was used. If vitreous presented either pre-operatively or intra-operatively, then anterior vitrectomy was performed. A PCIOL was placed if the surgeon determined it to be safe. This decision was based on the amount of inflammation and whether there was enough support of the posterior capsule. Several PCIOLs were placed during a subsequent surgery. No anterior chamber lenses were used. No contact lenses were used as they are unavailable and not practical in the region.

RESULTS

A total of 33 patients; 30 (91%) males and 3 (9%) females were included in the study. The age range was 5-70 years with a mean age of 26.8±6.2 years.

Main causes of trauma were chopping wood (42%), and stone chips from masonry (27%). Average time to clinic evaluation was 6.22 days. Preoperative visual acuity of 30 patients was light perception, hand movements or counting fingers. Average best-corrected visual acuity of the remaining 3 patients was $\geq$ 20/60. Postoperative visual acuity of 12 patients was light perception, hand movements or counting fingers. Average best-corrected postoperative visual acuity of the remaining 21 patients was $\geq$ 20/60. Final visual acuity of 20/40 or better was obtained in 45% of eyes. (Table 1)

Table 1: Pre and postoperative best corrected visual acuity of cataract surgry in cases of penetrating ocular trauma.

Visual Acuity	Presentation	Final outcome
20/15-20/40	1 (3%)	15 (45%)
20/50-20/120	2 (6%)	6 (18%)
20/200-5/200	1 (3%)	5 (15%)
<5/200	29 (88%)	7 (21%)

Table 2: Post-operative complications of cataract surgry in cases of penetrating ocular trauma.

Post operative complications	Frequency
1. Anterior Segment	
a. Posterior capsular opacification	10
b. Cornea edema	10
c. Wound leakage	8
d. Increased intraocular pressure	8
e. Irregular pupil	7
f. Fibrin deposits on IOL	6
g. Residual cortex	5
h. Decement's membrane folds	4
i. Corneal ulcer	3
j. Lens malposition	3
k. Posterior synechia	3
l. Hypopyon	3
m. Secondary angle closure glaucoma	3
n. Hyphema	2
o. Uveitis	1
p. Anterior synechia	1
2. Posterior Segment	
a. Retinal detachment	5
b. Vitreous in AC	4
c. Posterior chamber blood	3
d. Endophthalmitis	3
e. Retinal scar	2
f. Retinal fibrosis	1
g. Pthisical globe	2

Post-traumatic morphological changes included iris defects in 39% of patients. This included

prolapse in 9 patients, iridodialysis in 2 patients, iris tear and sphincter rupture in 1patient each. Zonular dehiscence was seen in 2 patients. Lens matter was seen in the anterior chamber (AC) of 2 patients, vitreous in AC in 3 patients, hyphema in 3 patients, hypopyon in 2 patients, anterior synechia in 2 patients, lens into the AC in 2, keratitis in 1patient.

Fifteen eyes (45.45%) were operated on the same day at presentation. In 16 eyes (48%) a PC IOL was implanted successfully during the primary repair. PCIOL was placed into the sulcus in 13 cases and in 3 cases lens implantation in the capsular bag was achieved. One PC IOL fell into the vitreous upon placement due to lack of capsular support so he was left aphakic and was referred to a vitreo-retinal surgeon at a tertiary hospital and further record of that particular patient was not available. Six PC IOL were successfully inserted secondarily ranging from 2-8 months after primary repair leaving 11 (33%) aphakic. One patient was scheduled for lens replacement but never returned. Patient's average length of follow up was 14.78 ±16.12 months.

Post operative complications included secondary angle closure glaucoma in 3 patients, Posterior capsular opacification in 10 patients & Corneal edema in 8 patients and wound leakage in 8 patients. Other anterior & posterior segment complications are given in Table 2.

DISCUSSION

Traumatic cataracts have been documented to be a major complication of occupational related eye injury in mainly young and economically productive men[7] which is also true in our study. The average age of patients in our study was 26.7 years, which is generally less than as mentioned in international studies,[8,9] yet not by colleagues in Hyderabad, Pakistan.[10] As in this study, a predominant male population is seen in these other studies.

The high incidence of stone & wood injuries is expected because all construction in this area of the world is done with stones, people continued reliance on wood for cooking and warming themselves during the cold weather respectively. We also observed children to be at high risk mainly because of lack of adult supervision.

Most patients chose to seek medical attention from either our facility or another (with subsequent referral to ours) after a relatively long amount of time (average of 7.2 days) but were operated on in an average of only 2.4 days. Several patients used traditional medications prior to arrival with one subsequently contracting fungal keratitis and one can only assume the number who self-treat and never seek care.

Posterior chamber IOL implantation following surgery for penetrating trauma was performed in 98.46% of patients in Ram et al study[11] and 34% in United Kingdom.[12] Our study showed that 67% of our patients were finally rehabilitated with posterior chamber IOL implantation.

We analyzed the data involving several complications that appeared to effect visual outcome. Of note were secondary glaucoma, endophthalmitis and retinal detachment. These have been hypothesized to be negative predictors in different studies.[13-16]

Ozer et al[17] reported lower incidence of secondary glaucoma after injury i.e. 4.7%. Similar results were seen in our study with relatively low number of glaucoma cases (8.5%) but patients with secondary glaucoma did not do well visually in our study. All three had final best-corrected visual acuities of less than 20/40 and two out of three were legally blind. We do not believe this to be due to lack of ability for surgical correction but more by patterns of patient follow-up. Patients with possible vision-threatening conditions such as glaucoma may not make the next important follow-up visit needed for a recheck of pressures or post-operative evaluation thus allowing the disease to irreversibly affect any chance of recovery.

Our higher rate of endophthalmitis than most other reports (all but Piermici's[15] paper had no mention of any cases at all) may be due to the observation that our rural population was at increased anecdotal incidence of fungal keratitis. Fungal keratitis leaves the eye very vulnerable to superinfection and quick identification of keratitis and frequent follow-up is imperative for optimal visual outcome.

Retinal detachment is commonly seen post-operatively in penetrating traumatic cataract cases as Greven[3] reported RD in 13% of cases. We saw 11.4% retinal detachments with variable visual outcomes.

In summary, a final visual acuity of 20/40 or better was achieved in 15 out of 33 patients (45%). This is in comparison to Greven[3] (55%) and Moisseiev[18] (67%). Verma[19] reported a final visual acuity of 20/40 or better in 80% of their patients but did not include patients with posterior segment abnormalities or retinal detachments.

Limitations of the study are its retrospective nature and relatively small sample size.

CONCLUSION

Good visual outcome was obtained in nearly half of the eyes in our study. The main anterior segment postoperative complications were posterior capsular opacification, corneal edema and wound leakage while retinal detachment, vitreous loss and endophthalmitis were the posterior segment complications.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.