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Article

FREQUENCY OF VISUAL IMPROVEMENT AFTER TRAUMATIC CATARACT SURGERY WITH INTRAOCULAR LENS IMPLANTATION IN PATIENTS HAVING PENETRATING OCULAR TRAUMA

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Abstract:

Objective: To determine the frequency of visual improvement after traumatic cataract surgery with intraocular lens implantation in patients having penetrating ocular trauma.

Material and methods: This cross sectional study was conducted at Department of Ophthalmology, Civil Hospital, Bahawalpur from 01-6-2017 to 02-06-2019. Total 151 patients of traumatic cataract surgery were selected and visual improvement was assessed in selected patients.

Results: The improvement of visual acuity (Good visual acuity = 6/6-6/12) was found in 125 (82.8%) patients after traumatic cataract surgery with intra ocular lens implantation. Visual acuity did not improve upto level of Good visual acuity (6/6-6/12) in 26 (17.2%) patients. The majority of the patients (59.6%) were aged between 15-20 years and in which males were dominant showing that more younger males were affected mostly with trauma.

Conclusion: Patients with traumatic cataract after penetrating trauma can have good visual improvement after cataract removal and IOL implantation, depending upon management and complications.

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INTRODUCTION:

Traumatic cataract is one of most common cause of unilateral, partial or total loss of vision in all age groups. Ocular injuries represent a heavy burden to emergency departments, and associated with long-term complications and reduced quality of life.^{1,2}. Its management is more difficult because of distortion of ocular structures and subsequent post-operative complication.

In United States, 6.8 per 1000 population suffered from ocular trauma, which required treatment.³ From 1992 through 2001 the overall rate of eye injury ranged from 8.2-13.0 per thousand population.⁴ Blunt trauma or penetrating trauma, both can cause traumatic cataract formation. Children and young adults especially boys are predisposed to trauma because of their playing activities and so have higher incidence of traumatic cataract⁵. Several studies have explored that early cataract extraction with IOL implantation⁶ in traumatic cataract results in good vision.⁷. Many treatment options can be used for intraocular lens implantation according to peroperative capsular bag condition. Regarding intraocular lens(IOLs), anterior chamber lens, posterior chamber lens and scleral fixation IOLs are available. However ciliary sulcus fixation is safe if the posterior capsule is compromised but zonular support is maintained⁸.

A significant difference of final visual outcome is found when it is compared before and after surgical and medical treatment. There is also significant relationship exists between age and final visual outcome.

Cataract resulting from ocular penetrating trauma is very common among patients presenting to our hospital. Most of these patients are young and middle age males working in farming field. They are active members of the society and need a better visual acuity in order to earn their livelihood or peruse their professional/educational demands. The cataract surgery with intraocular lens implantation in such patient is usually fruitful in terms of gain in visual acuity. The aim of the present study is therefore to find the frequency of visual improvements after traumatic cataract extraction in our population. This study was carried out at civil hospital Bahawalpur. Sample size calculated was 30 taken from the results of a recent study and a copy of its reference is attached along with

it. As the data available about this topic is limited so I wanted to carry out this study and the results of our study are favorable for this surgical procedure that could be practiced by the ophthalmologists.

MATERIAL AND METHODS:

This cross-sectional study was conducted at Department of Ophthalmology, Civil Hospital, Bahawalpur from 01-6-2017 to 02-06-2019. Total 151 patients of traumatic cataract having age 15-30 years either male or female were selected.

Patients having vitreous prolapsed and laceration extending 3mm beyond limbus due to trauma (slit lamp examination), patients having posterior segment trauma, e.g vitreous hemorrhage, retinal detachment or optic nerve damage (assessed through indirect Ophthalmoscopy and B. scan ultrasonography.) and patients with hereditary retinal disorders like retinitis pigmentosa etc (indirect ophthalmoscopy) were excluded from the study.

DATA COLLECTION PROCEDURE

Permission for this study was taken from the local ethical committee of this hospital. Patients with history of penetrating trauma presenting to Eye OPD of Civil Hospital, Bahawalpur and fulfilling the inclusion & exclusion criteria were enrolled for this study.

Full informed consent was taken from all the patient especially regarding surgical procedures and use of different anesthetic technique to be evaluated in our study.

A pre-designed proforma (Annexure-A) was filled along with demographics like name, age, gender and address.

MethodologyExamination:

All patients were undergone thorough complete ophthalmic examination

- Best corrected visual acuity (BCVA) using Snellen's visual acuity chart
- Pupillary light reflex and relative afferent papillary defect.
- Extraocular motility examination
- Intraocular pressure by Goldmann applanation tonometer
- Slit lamp biomicroscopy of anterior segment of eye,
- Distan direct of ophthalmoscopy,

- Fundus examination using direct ophthalmoscope, indirect fundus viewing lens (+90D),
- B SCAN ,If posterior segment was not visible B.Scan Ultrasonography was done to rule out any posterior segment pathology for example retinal detachment.

Complete systemic examination of every patient was done whenever needed concerned medical specialist was consulted.

Investigation

1. Blood complete examination.
2. Urine complete examination.
3. Blood sugar.
4. X-ray Chest
5. Viral marker i.e. Hepatitis B & C.

After completing ophthalmic examination every patient of my study was undergone traumatic cataract surgery.

The surgery was performed under retrobulbar anesthesia in adults. However, general anesthesia was may required for uncooperative patients

SURGICAL TECHNIQUE;

The lids and periocular area were painted with povidone iodine 5% solution twice and the patient draped. Once fully draped, the eye speculum was inserted, and then forth dose of proparacain 0.5% was poured on the exposed ocular surface.

All surgical procedures were performed by surgeon who had performed cataract surgery since 2009, using a standardized clear corneal irrigation and aspiration of lens matter with intraocular lens implantation.

A clear corneal tunnel incision was made. 1-2 stitch applied at penetrating wound in needed cases. The anterior chamber was reached with a 2.8 mm to 3.2 mm disposable keratome. Trypan blue was used to stain the capsule in white cataracts, which makes the procedure simple. Viscoelastic (2% hydroxy propyl methyl cellulose), was used to maintain the anterior chamber. Pre-existing posterior synechiae with a miotic pupil were released with visco-cannula. Capsulotomy was done, Capsulorrhexis was performed as in intact anterior capsule cataract surgery with a 26-gauge bent. A side port was made with 11#blade at 40degree.

A Simcoe's cannula was used to aspirate soft cataracts thru side port and main corneal wound. However, for thick cataracts. aspiration and vacuum settings of phacoemulsification was used.

Great care was taken, especially in the performance of the capsulorrhexis and cortical removal steps, not to further weaken already compromised zonular support.

If zonular dialysis was noted on the table, we can use capsular tension rings for stabilization.

In case of good capsular bag support, the IOL (foldable or 5.2mm PMMA IOL) was placed in the bag, otherwise ciliary sulcus-supported posterior chamber IOL (6.5mm PMMA) were placed.

Following IOL implantation and removal of the viscoelastic substance, the pupil was constricted with intracameral application of 0.01% carbachol (Miostat; Alcon Surgical, Ft Worth, Tex). All the patients required only one suture to close the wound. At the end of the surgery, all patients received an identical regimen, including 2 mg of dexamethasone acetate (Fortecortin; Merck, Cologne, Germany) and gentamycin (0.25 ml each) subconjunctival injection using 27gauge needle with 1cc syringe. Each eye was padded.

All patients were given prophylactic oral antibiotic (ciprofloxacin 750 mg twice daily for three days).

After 24hrs of surgery, the dressing was removed, eye was examined, and topical medications were started. During postoperative recovery, each patient received topical corticosteroid and moxifloxacin eyedrops at dose of 1hourly initially for 1week then 3 hourly thereafter, and a combination of a corticosteroid and antibiotic ointment at night, the dosage being tapered gradually depending on the degree of postoperative inflammation over a period of 1 and half months..

The operated patients were re-examined after 1week, 2, and 6 weeks to enable refractive correction. At every follow-up examination, visual acuity was tested with Snellen's chart. The anterior segment was examined with a slit lamp, and the posterior segment, with an indirect ophthalmoscope and intraocular pressure.

After 6 weeks of surgery visual acuity was assessed by snellen visual acuity chart, eyes with vision = 6/6 – 6/12 (at 6 weeks) were defined as having a good visual acuity. All this information were recorded on a pre-designed Proforma (Annexure).

DATA ANALYSIS

Data was analyzed through SPSS version (10). Quantitative variables like age was calculated as mean \pm SD. Qualitative variables like visual improvement (VA), gender were calculated as frequency and %age. Data was stratified for age, gender & baseline VA to address effect modifiers. Chi-square test was used for post stratification to see the effect of these on outcome

variables. P-value of ≤ 0.05 was considered significant.

**Table 1: Distribution of patients according to age
(n= 151)**

Age in years	No. of patients	Percentage
15-20	90	59.6%
21-25	39	25.8%
26-30	22	14.6%

Table 2: Sex distribution of patients

Sex	No. of patients	Percentage
Male	101	66.9%
Female	50	33.1%

Table 3: Stratification of patients according to initial visual acuity

Visual Acuity < 6/36		Visual acuity > 6/36	
Male	Female	Male	Female
80 (52%)	30 (19%)	21 (13%)	20 (13%)
Total = 110 (72%)		Total 41 (28%)	
Grand Total = 151 (100%)			

Table 4: Visual acuity improvement after traumatic cataract surgery

Good Visual acuity (6/6-6/12) after surgery	No. of patients		Total	p- Value (Chi- square test)
	Male	Female		
YES	86 (56.95%)	40 (26.49%)	126 (83.44%)	p<0.04231 (Result is not significant at P<0.05)
NO	15 (9.93%)	10 (6.62%)	25 (16.55%)	
Total	101 (66.88%)	50 (33.11%)	Grand Total 151 (100%)	

RESULTS:

A total of 151 traumatic cataract patients were operated at Eye dept, Civil hospital, Bahawalpur for 2yrs (from 01-6-2017 to 02-06-2019). The age ranged between 15 to 30 years with mean age: 20.4 ± 4.2 years (table;1). Among these patients, 101 (66.9%) were males and 50(33.1%) were females.(Table No. 2)

The improvement in visual acuity was observed in 126 (83.4%) patients (see Table#3) .

As can be observed from Table#3, the improvement of visual acuity was seen in 57% of the males participants and 6% of the females participants. It is also observed that good visual acuity was not observed after cataract surgery in about 25 (16.5%) patients.

In our study, posterior chamber intraocular lens was implanted in most of the patients (93%) and in only 7 (5%) patients Anterior chamber IOL was implanted and 7 (4.6%) patients were left aphakic due to inadequate capsular support. This is another reason for failure to improve visual acuity in some patients after cataract surgery.

The major postoperative complications encountered on first postoperative day were anterior uveitis almost in all patients and corneal oedema was seen in 10 (6.6%) patients which responded to medical therapy.

DISCUSSION:

Traumatic cataract is one of the most common complication of ocular injuries and this cataract is one of the common causes of blindness, second most common cause of unilateral, partial or total loss of vision in all age groups. There is a 1-15% incidence of traumatic cataract in ocular injuries⁶. Trauma is the leading cause of 90% of acquired paediatric cataracts.⁹

Currently, the only effective treatment of traumatic cataract is surgical removal with, in most cases, insertion of an intraocular lens to restore optical system of eye¹⁰. Most of the ocular trauma occurs in children and in adults in the productive age group, a finding which was also seen in the this study that 60% patients were with age 15-20yrs. Thompson *et al.* observed that a majority of the ocular trauma in children occur at home and field due to lack of adult supervision. Another considerable point is that 101 (66.9%) cases were males in my study showing that Males are more likely to sustain an eye trauma than females because they are more likely to be involved in hazardous sports and occupations⁶. Worldwide males are more commonly involved in traumatic cataract than females.

Regarding cause of penetrating injuries, wooden sticks and sharp thorns were the most common causes of traumatic cataract especially peoples working in farming field. Many children were involved in helping their parents in collecting wooden sticks that are used as fire purpose¹¹. Hanging branches of tree were also common cause. Most of the children came from lower socio-economic background. They were more involved in agricultural activities and playing more outdoor sports like cricket ball, toy guns and fire crackers¹² Surgical interventions for traumatic cataract has variable outcome¹³⁻⁴.

The repair of the traumatic wound and lensectomy is better to be done at the same session.¹⁵

Recent advances in surgical technique, equipment and intraocular lenses have significantly affected the way surgery is being performed. Most of surgical interventions are doing by procedure of phacoemulsification and then ECCE and irrigation aspiration¹⁶.

For management of traumatic cataract ,different treatment modalities can be used for surgery and intraocular lens implantation according to the type of cataract and extent of injury for example capsular bag intraocular lens implantation, anterior chamber lens implantation and scleral fixation however ciliary sulcus fixation is safe if the posterior capsule is

compromised but zonular support is maintained^{8,17}.

The normal anatomy of eye was distorted. Adherent leucoma or corneal scars causes the problem in observation of the cataract, posterior capsule and vitreous. Anterior chamber may be shallow or of irregular depth with iris prolapse. Anterior capsulorhexis was not possible in many cases due to ruptured anterior capsule.

In our study, a high percentage of patient showed improvement visual acuity which shows the importance of removal of cataract and early IOL implantation¹⁸⁻¹⁹, providing an everlasting solution to aphakia and results in a good visual prognosis. In blunt trauma and penetrating trauma cataract is most important and leading cause of decrease vision^{17,20} and our results shows that if we removed cataract patients can return their primary good vision. Children with corneal trauma due to the sharp objects have good prognoses, probably due to less corneal injury

The improvement in visual acuity as seen our patient was not statically significant due to the fact that these patients did not seek early consultation for their ocular problem by an Ophthalmologist and it was observed after surgery on retinal examination that most of these patients had posterior segment pathologies i.e. traumatic optic neuropathy in 5(3.3%) patients, traumatic macular hole in 2 (1.3%) patients and macular scar in 3 (1.9%) patients.

Another important reasons for decreased vision in our study were primary posterior capsular opacification in 6% patients, corneal opacity ,high astigmatism, aphakia, glaucoma, vitreous hemorrhage, traumatic optic neuropathy, retinal detachment, macular hole, epiretinal membrane (macular scar).

Patients of primary posterior capsular opacity were counselled properly for cause of their decrease vision and followed up for nd. YAG laser capsulotomy after duration of 6 months from time of surgery.

Implantation of intra ocular lens (IOL) in traumatized eyes after removal of traumatic cataract depends on availability of capsular support²¹⁸⁻¹⁹. In capsular bag or Zonular support posterior chamber IOL was preferred if there was insufficient capsular or Zonular support patients were left aphakic. These aphakic patients were called after 3 months for anterior chamber IOL implantation.

The commonest postoperative complication in these traumatic cataractous eyes was anterior uveitis that was well controlled with topical therapy.

None of patients developed endophthalmitis

This study revealed that satisfactory visual outcome in majority of patients with traumatic cataract could be safely achieved after cataract removal and IOL implantation.

Zaman *et al.*¹⁰ and Cheema *et al.*²⁰ reported visual acuity of 6/18 or better in 68.7% of patients. Gain *et al.* concluded that postoperative visual acuity depends on complications²¹ and findings of our study are consistent with these findings.

Regarding timing of surgery after trauma, results didn't effect final visual outcome however early surgery is better in term of lower complication. One study has been performed by Shah *et al* to determine the effect of interval between the time of injury and time of intervention on the final visual outcome in cases of traumatic cataract resulting early surgery is better²². Some other authors like Memon *et al* advocate secondary procedure in the absence of fragmentized or intumescent traumatic cataract to manage traumatic cataract.²³

Blindness from ocular trauma can be avoided by imploing protective eye wears especially in high risk activities. Patient education in schools, baby day care centers and through media must be carried out to prevent ocular injuries in children. Once the injury has occurred, outcome depends on extent of injury to ocular and peri-orbital structures and immediate and professional approach must be taken to prevent blindness.

Limitations of this study were a small sample size and a fixed follow-up period. This study was conducted at a tertiary care hospital where large number of complicated cases were presented for management in which most of patients managed but not included in study due to falling in excluding criteria. It also affected the surgical success rates and outcome. A majority of the patients were from rural areas and seen by local doctors postoperatively for their convenience which limited the follow-up period.

CONCLUSION:

Patients with traumatic cataract can have good visual outcome after cataract removal and IOL implantation, depending upon early management and avoidance of complications. Young males are commonly affected. Taking protective measures in farming and

agricultural work and patient education can avoid ocular trauma and traumatic cataract formation.

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