

A Clinical Study on Management of Traumatic Cataract - A Research Article

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ABSTRACT

Aims and Objective

1. The incidence of traumatic cataract patients attending hospital
2. The associated ocular morbidities of traumatic cataract.
3. To assess the visual outcome following cataract surgeries in eyes with traumatic cataract

Methods and materials: A total of 50 patients with traumatic cataract were taken up for the study. A thorough history and a detailed ocular examination were done. After proper pre-operative investigations and preparation, patients underwent surgery.

Results and observation: Among the 50 cases of Traumatic cataract, 17 cases (34%) were less than 10 years of age. A male preponderance was seen .37(74%) were males and 13 (26%) were females. 28 (56%) cases were due to blunt trauma and 22 cases (44%) were due to penetrating injury. Corneal involvement was the commonest in the form of corneal scars, opacity etc. 39 cases (78%) underwent SICS with PCIOL implantation. Lens aspiration with PCIOL in 3 cases, phacoemulsification with PCIOL in 4 (8%) cases. The final visual acuity recorded at the end of 6 weeks was found to be 6/6-6/18 in 23 (79.31%) cases, less than 6/18-3/60 in 9 cases (19.15%) cases, none of the patients had a visual acuity less than 6/60.

Conclusion: Visual prognosis depends on early reporting and diagnosis followed by proper management.

Keywords: Ocular trauma, traumatic cataract, cataract surgery, ocular morbidities

INTRODUCTION

Ocular trauma is an important cause of mono-ocular blindness in the world. 40% is related to it. ^[1,2] Traumatic cataract that may occur after various types of ocular insult is a serious visually challenging sequel of trauma.

Domestic injuries are the commonest mode of injury in children. In adults sports and work related eye injuries are common.

Traumatic cataract that develops during the early stages of life besides the visual impairment it can also cause amblyopia. Profound visual impairment can result due to stimulus deprivation during the early stage.

For proper management a detailed history and a pre-operative examination is a must before performing surgery in a case of traumatic cataract. Intraocular foreign bodies and open globe injuries should be ruled out before surgery.^[3]

The final visual outcomes depend on the type of trauma, extend of lenticular involvement and associated damage to the ocular structures. In adults the time of intervention of cataract surgery should be carried out and completed within a year and within 6 months in children.^[4]

Surgery for traumatic cataract can be primary or secondary. When the lens is fragmented, swollen causing a pupillary block or lens opacity blocking the view of

posterior segment, primary cataract removal is done. However secondary cataract removal is more beneficial because of improved visibility, proper intraocular lens power calculation, and there is less chances of post operative inflammation.^[5]

MATERIALS AND METHODS

A total number of 50 patients with traumatic cataract were taken up for the study. The study was conducted for one year from June 2018 to July 2019 in a tertiary care hospital.

SELECTION OF CASES:

The cases were selected from the outdoor as well as indoor patients. After explaining the purpose of the study, informed and written consent were obtained for all the patients.

INCLUSION CRITERIA:

1. **Sex:** Both male and female patients were included
2. **Age:** Patients of age group 2-70 years.
3. Patients who were diagnosed of having unilateral traumatic cataract

EXCLUSION CRITERIA:

Patients with

1. Central corneal scar
2. Vitreous haemorrhage
3. Retinal detachment
4. Ocular deviation
5. Optic nerve avulsion
6. Poor vision before suffering from ocular trauma, based on history, previous glass prescriptions and medical records.
7. Patients with previous ocular surgery and ocular disease or disorders.

METHODOLOGY:

A detailed history of the type of trauma (blunt /penetrating), mode of ocular trauma, eye involved, object causing trauma, duration between trauma and presentation were taken.

A thorough ocular examination including visual acuity, torch light examination, slit lamp examinations, direct and indirect ophthalmoscopy, slit lamp biomicroscopy with +90 dioptre lens, Tonometry, Gonioscopy, B-Scan ultrasonography and routine x-ray orbit was

done. OCT, FFA, CT-scan and MRI were done whenever required.

- A scan biometry and keratometry were done for intraocular lens power calculation. The power of the other eye was calculated in cases of corneal scarring.
- Using the SRK 2 formula IOL power was calculated.

GENERAL EXAMINATION:

- In all cases general and systemic examination were done.
- In patients requiring general anaesthesia, a pre anaesthetic check up was done prior to the day of surgery.
- To rule out any hypersensitivity, lignocaine 2% skin test was done.

PRE OPERATIVE INVESTIGATIONS:

Pre operative investigations including Random blood sugar, Routine blood analysis, Serum creatine, X ray chest, Electrocardiogram were done.

PREOPERATIVE PREPARATION:

- Informed and written consent was taken from the patients as well as attendants in case of minor children
- Systemic antibiotics were started in all cases 2 days before surgery
- Topical anti-inflammatory drugs and topical antibiotics were started 2 days before surgery
- In cases having increased intraocular pressure preoperatively, topical as well as oral anti- glaucoma medications were started
- Povidone iodine (5%) painting was done of the ocular adnexa on admission, during the pre-operative check up and on the operating table just prior to the surgery.
- Pupils were dilated with tropicamide 0.8% and phenylephrine 5% until full mydriasis is achieved
- Patients requiring general anaesthesia were advised to stay nil per orally overnight before the day of surgery.

SURGICAL PROCEDURE:

- Surgeries were done under peribulbar anaesthesia.
 - Uncooperative patients and children were posted under general anaesthesia
- Preferred procedures adopted was Manual Small Incision Cataract surgery (MSICS) with posterior chamber intraocular lens (PCIOL) and other surgical procedures were Phacoemulsification with PCIOL, Lens irrigation and aspiration (IA) with PCIOL, SICS with Scleral fixated IOL(SFIOL), SICS with anterior vitrectomy with SFIOL.

All patients were given topical antibiotic steroid combination eye drop and a short acting cycloplegic drop in the postoperative period. Systemic steroid was given where indicated. Follow up of all patients were done on first post-operative day, at two weeks and after six weeks. Best corrected visual acuity (BCVA) was recorded and spectacle correction was done at the end of 6 weeks.

RESULTS AND OBSERVATIONS

Out of 50 cases, 37 were males and 13 were females with ratio M:F= 2.85:1.

Table 1: Sex and age wise distribution of traumatic cataract patients

Age group(years)	Male(%)	Female(%)	Number of cases(%)
<10 years	11(29.73%)	6(46.15%)	17(34%)
11-20 years	3(8.02%)	1(7.69%)	4(8%)
21-30 years	7(18.92%)	1(7.69%)	8(16%)
31-40 years	6(16.21%)	4(30.77%)	10(20%)
41- 50 years	4(10.81%)	0	4(8%)
51-60 years	6(16.22%)	1(7.69%)	7(14%)
Total	37(100%)	13(100%)	50(100%)

Maximum numbers of cases were found in less than 10 years of age about 34% mostly during playing and due to lack of adult supervision. Again 46% patients belonged to the age group of 21-50 years who are mostly involved in agriculture and industrial works.

Table 2: morphology of traumatic cataract according to the type of injury:

Type of cataract	Total cataract	Rosette cataract	Soft cataract	Total
penetrating	16(41.03%)	0	5(100%)	22(44%)
blunt	23(58.97%)	6(100%)	0	28(56%)
total	39(100%)	6(100%)	5(100%)	50(100%)

df= 2 p<0.01

Out of 39 total cataract cases, 58.97% suffered from blunt trauma. All the 5(100%) soft cataract cases were due to penetrating injury and all 6(100%) cases of rosette cataract were due to blunt trauma. A statistically significant association was found between morphology of traumatic cataract and the type of trauma.

Table 3: pre-operative visual acuity:

Visual acuity	Blunt trauma	Penetrating injury	Total
PL/PR	7(24.13%)	10(47.62%)	17(34%)
HMCF	19(65.52%)	9(42.56%)	28(56%)
CF	2(6.90%)	0	2(4%)
Could not be assessed	1(3.45%)	2(9.52%)	3(6%)
Total	29(100%)	21(100%)	50(100%)

df=3 p=>0.05

Out of 29 blunt trauma patients, 65.52% patients had a pre-operative visual acuity of HMCF. And 47.62% from 10cases of penetrating injury has visual acuity of PL/PR. Therefore, the association between the pre- operative visual acuity and type of trauma was not found to be statistically significant.

The visual acuity recorded of the unoperated eye was found to be within normal limits.

Table 4 : duration between trauma and surgery:

Duration	No. of cases	Percentage
Within 1 month	11	22%
1 month-1year	36	72%
More than 1 year	3	6%
Total	50	100%

Table 5: associated ocular morbidities:

Associated ocular damage	No. of patients	Percentage%
Corneal involvement	21	42%
Anterior capsular tear with lens matter in AC	9	18%
Posterior synechia	8	16%
Dislocation/subluxation	8	16%
Uveitis	4	8%
Raised IOP	3	6%
Iris injury	3	6%

Corneal involvements in the form of corneal scars, opacity or sealed corneal wounds were found. And iris injury in the form of iridodialysis and traumatic mydriasis was found.

Table 6: Type of surgery:

Type of surgery	Number of patients	Percentage%
SICS with PCIOL	39	78%
Phacoemulsification with PCIOL	4	8%
Lens aspiration with PCIOL	3	6%
SICS with SFIOL	3	6%
SICS with anterior vitrectomy with SFIOL	1	2%
Total	50	100%

39 cases underwent SICS (Small incision cataract surgery) with posterior chamber intraocular lens implantation out of 50 cases of traumatic cataract. Phacoemulsification with PCIOL implantation was done in 4 cases. In 3 cases manual/phaco aspiration of the cataractous lens with PCIOL implantation was done. SICS with scleral fixated IOL and SICS with anterior vitrectomy were done in 2 and 1 cases respectively.

Visual result:

Patients were followed up at post operative day 1, 2 weeks and 6 weeks after surgery. Final visual acuity (best corrected visual acuity) was measured at 6 weeks after surgery.

3 cases lost follow up.

Table 7: final BCVA at 6 weeks post operative (n= 47)

Final visual acuity	No. of eyes	Percentage%
6/6	2	4.25%
6/9	6	12.76%
6/12	16	34.04%
6/18	14	29.79%
6/24	4	8.51%
6/36	2	4.25%
6/60	3	6.38%
<6/60	0	0
Total	47	100%

The final visual acuity was graded into 3 categories based on “WHO Vision categories”

- Vision of <3/60 as blind
- Vision of 3/60 to < 6/18 as low vision (visually impaired)
- 6/18 and above as adequate vision

The best corrected visual acuity was assessed at the end of 6 weeks and it was found that none of the patient had a visual acuity of less than 6/60.

Table 8: final BCVA in relation to type of trauma(n=47)

Final BCVA	Blunt trauma	Penetrating trauma	Total (%)
6/6 – 6/18	23(79.31%)	19(90.48%)	38(80.85%)
< 6/18 – 3/60	6(20.69%)	2(9.52%)	9(19.15%)
Total	29(100%)	21(100%)	47(100%)

df= 1 p>0.05

79.31% (23) had a post operative final BCVA of 6/6- 6/18 out of 29 blunt trauma cases. And 90.48% (19) out of 21 penetrating injury cases. There was no statistically significant association between the type of trauma and post operative final BCVA.

Table 9: BCVA in relation to the type of cataract (n= 47)

Final BCVA	Type of cataract			Total
	Total cataract	Soft cataract	Rosette cataract	
6/6 – 6/18	28(77.78%)	5(83.33%)	5(100%)	38(80.85%)
<6/18 – 3/60	8(22.22%)	1(16.67%)	0	9(19.15%)
Total	36(100%)	6(100%)	5(100%)	47(100%)

df=4 p>0.05

However, the association between morphology of traumatic cataract and final BCVA was not statistically significant.

Table 10: BCVA in relation to duration between trauma and surgery(n=47)

Duration between trauma and surgery	6/6-6/18	< 6/18-3/60	Total
<1 month	8(21.05%)	1(11.11%)	9(19.15%)
1month- 1 year	29(76.32%)	7(77.78%)	36(74.48%)
>1 year	1(2.63%)	1(11.11%)	2(4.27%)
Total	38(100%)	9(100%)	47(100%)

df=2 p>0.05

Out of 38 patients who had final BCVA of 6/6-6/18, in 76.32% (29 cases), the duration between trauma and surgery was 1 month- 1 year. Similarly in 74.48% (7 cases), out of 9 patients who had final BCVA of <6/18- 3/60, the duration between trauma and surgery was 1 month- 1 year. Therefore, no statistically significant association was found between the final BCVA and the duration between trauma and surgery.

Table 11: pre operative and post operative final BCVA in traumatic cataract patients

Post operative final BCVA	Pre operative visual acuity				TOTAL
	PL/PR	HMCF	CF	CNA	
6/6-6/18	11 (73.33%)	24(85.71%)	2(100%)	1(50%)	38(80.85%)
<6/18 3/60	4(26.67%)	4(14.29%)	0	1(50%)	9(19.15%)
Total	15(100%)	28(100%)	2(100%)	2(100%)	47(100%)

Post operative final BCVA was found to be 6/6- 6/18 in 80.85% (38 cases) out of total 47 patients, irrespective of their pre- operative visual acuity.

To test the statistical significance, Chi squared test was applied by manual method and a value of $p < 0.05$ was considered to be statistically significant.

DISCUSSION

The present study was conducted on 50 cases of traumatic cataract.

Children are more active and more often meet with accidents while playing with stones, wooden sticks and other objects. Lack of adult supervision also plays role in trauma. Therefore, age wise analysis showed that majority of the traumatic cataract cases

occurred in the age group < 10 years of age. A considerable amount of patients of age group 21-50 years due to their involvement in industrial work and farming are more exposed to trauma.

A similar age group distribution was also showed by a study by Daljith Singh et al

Table 13: comparison of age wise distribution

Age group	Daljith Singh et al (n=61)	Present study(n=50)
< 10 years	11(18.03%)	17(34%)
11-20	10(16.39%)	4(8%)
21-30	20(32.78)	8(16%)
31-40	7(11.47%)	10(20%)
41-50	2(9.83%)	4(8%)
>50	2(9.83%)	7(14%)

As men spend most of their time outdoors in industrial or farming, therefore the study showed a male preponderance (74%)

Table 14: comparison of sex wise distribution

Sex	Krishnamachariy ^[6] et al(n=237)	Memon M ^[7] et al(n=41)	Shah MA ^[8] et al(n=687)	Present study(n=50)
Male	127(53.59%)	31(75.61%)	492(75.61%)	37(74%)
Female	110(46.41%)	10(24.39%)	195(28.4%)	13(26%)

Associations of traumatic cataract:

The visual gain in eyes operated for traumatic cataract may be compromised by the damage to the other ocular tissues.

Out of the 50 cases of traumatic cataract, 21 patients (42%) had involvement of the cornea in the form of opacity, sealed corneal wound and scars. Corneal opacity and corneal scarring affected the visual acuity by obstructing the visual axis and cause astigmatism.

Raised IOP was noted in 3 patients (6%). Iris injury was found in 3 patients (6%). Posterior synechiae and uveitis were observed in 8(16%) and 4(8%) cases.

Table 15: comparison of associated ocular morbidities

Studies	Associated ocular morbidities			
	Corneal injury (scar, opacity)	Lens related (subluxation, anterior capsular tear)	Posterior synechiae	Iris related
Krishnamachari ^[6] et al	60.5%	3%	-	49.6%
Daljit Singh et al	37%	6.5%	9.8%	26.2%
Valentine Loncar ^[10] et al	20.83%	20.83%	-	12.5%
Renuka Srinivasan ^[9] et al	82.4%	-	-	6%
Present study	42%	18%	16%	6%

Type of surgery:

39 cases out of 50 cases of traumatic cataract in the present study underwent SICS (small incision cataract surgery) with posterior chamber intraocular lens implantation. Manual/phaco lens aspiration with PCIOL was done in 3 cases. In 4 cases phacoemulsification with PCIOL implantation was done. SICS with scleral fixated IOL was done in 3 cases and SICS with anterior vitrectomy was done in 1 case.

In 1996, Marcus Blum^[11] et al made a study in 148 eyes with traumatic cataract. There PCIOL was implanted in 42(66.6%) of penetrating injury group and in 72(84.7%) patients of blunt trauma.

In 1998, Krishnamachary M, Rathi V^[6] et al reviewed 237 children who developed traumatic cataract. In the study extra capsular cataract extraction with IOL implantation was performed in 65.67% of patients.

In 2005, Chuang LH, Lai CC^[12] evaluated 30 patients of traumatic cataract in open globe injury. In all patients cataract extraction was done with primary repair of the penetrating wound. Pars plana vitrectomy with lensectomy was done in

18(60%) eyes and 12 eyes (40%) underwent lens aspiration or extracapsular cataract extraction.

Duration between trauma and surgery:

This varied from one week to more than a year. 11 cases (22%) presented within 1 month, 36(72%) and 3 cases (6%) presented within 1 month to 1 year and more than 1 year respectively. The duration between trauma and surgery did not affect much in the visual outcome in the present study.

In 2012, Memon M and Narsari A^[7] et al made a study on 41 patients and concluded that duration between injury and cataract surgery did not affect the final visual outcome in traumatic cataract patients.

Intraoperative complications:

Either due to trauma or surgery or both, there can be intraoperative complications. Vitreous loss was found in 5(10%) patients with posterior capsular rupture.

In 1998, Shoeb Ahmed^[13] reported 10(20%) cases of vitreous loss in his study of 50 cases of traumatic cataract.

Post operative complications:

Table 16: comparison of post operative complications

Studies	Striate keratopathy	hyphaema	IOL decentration	PCO
Daljit Singh at al	30%	6.5%	-	-
Renuka Srinivasan ⁹ at al	8.8%	11.8%	38.2%	9%
Present study	4%	2%	2%	20%

Visual result:

The patients were followed up at post operative day 1, 2 weeks and 6 weeks after surgery and the final BCVA was

documented in 47 cases as 3 cases were lost for follow up.

The BCVA was assessed at the end of 6 weeks. The final visual acuity was graded based on WHO Vision categories as:

- Vision <3/60 as blind
- Vision of 3/60 to 6/18 as visually impaired
- 6/18 and above as adequate vision

In 38(80.85%) cases, the final BCVA was better than 6/18 and <6/18 – 3/60 in 9(19.15%) cases. None of the patients had a visual acuity less than 6/60

In various studies by different authors, similar results were obtained:

Daljit Singh et al made a study in 61 cases of traumatic cataract and observed a final visual acuity of 6/6 to 6/12 in 79% of patients after surgery.

Renuka Srinivasan, Kumudhan^[9] et al noted a final visual acuity of 6/12 or better in 88.2% patients.

Eckstein Michael, Vijaylakshmi P, Killedar M^[14] noted a visual acuity of 6/12 or better in 67% of patients who underwent cataract extraction with PCIOL implantation.

Murali Krishnamachary^[6] observed a post operative visual acuity of 20/60 or better in 74.1% patients.

In 2004 Valentina L Loncar, Ivana Petric^[10] did a retrospective analysis of 24 eyes of traumatic cataract and were treated surgically . The final visual acuity improved in 17 cases but 7 patients out of 24 patients did not benefit from cataract surgery as there was traumatic involvement of retina and opacification of posterior capsule.

Pavlovic S, Weinand F^[15] et al noted that 72.7% eyes achieved a final visual acuity of 0.5 or better after surgery.

In 2005, Chuang LH, Lai CC^[12] observed 30 patients who had traumatic cataract in open globe injury and they underwent cataract extraction and repair of the penetrating wound. 17 eyes (56.7%) achieved final best corrected visual acuity of 20/40 or better.

In 2010, Rumelt S^[16] et al made a study on 69 patients who developed traumatic cataract following open and closed- globe injuries and concluded a final BCVA of 20/40 or better. However, it was not statistically associated with the type of

cataract extraction, timing of surgery or IOL implantation.

Jagannath C, Penchalaiah T, Swetha M, Prabhu^[17] did a cross sectional study conducted among 40 traumatic cataract cases attending outpatient units of SVRR Government General Hospital, Tirupati . It was found in the current study, that 70.0% cases regained best corrected visual acuity of 6/6 to 6/18.

In 2016, Akshay J Bhandari, Shobhana A Jorvekar, Pranay Singh, Surekha V Bangal^[18] made a study on fifty eyes in 50 patients were studied and found the postoperative visual acuity in 28 eyes was 6/6–6/12, whereas 20 eyes had visual acuity of 6/18–6/36 and two eyes had visual acuity less than 6/60. The cause of poor visual acuity was mainly corneal opacity and posterior capsular opacity.

In 2017, S Shantanu Bhattacharjee, Arvind Ram, Nanda IA et al^[19] made a study of 45 patients with traumatic cataract and found corrected Visual Acuity (VA) at the end of 6th week between 6/6 and 6/60. 25 cases (55.5%) had VA 6/6-6/9, 15 cases (33.3%) had VA of 6/12 to 6/18, 4 cases (8.9%) had VA between 6/24 and 6/36 and 1 case had VA 6/60. The group which had VA between 6/12 and 6/18 was due to the presence of posterior capsular opacification.

CONCLUSION

Traumatic cataract is a serious visually challenging sequel of trauma. In cases of traumatic cataract, to have a better visual outcome after surgery, early diagnosis followed by proper management plays an important role. Therefore stress has to be given on awareness of the public and ocular safety measures should be taken at work places to prevent the ocular hazards associated with the ocular trauma. In addition, early reporting and adequate follow up especially in cases of children needs to be emphasized.

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