

## Visual outcome following cataract surgery in patients with traumatic cataract in a tertiary hospital, South India

Soumya Ramani<sup>1,\*</sup>, Thanuja G P<sup>2</sup>, Divya D Sundaresh<sup>3</sup>

<sup>1,2,3</sup>Assistant Professor, Dept. of Ophthalmology, M. S. Ramaiah Medical College, Bengaluru

**\*Corresponding Author:**

Email: soumya.ramani@gmail.com

### Abstract

**Aim:** To analyze the intraoperative complications and postoperative outcome during cataract extraction in traumatic cataract.

**Methods:** A retrospective analysis of all the traumatic cataracts presenting at M.S. Ramaiah Medical College Hospital during the period between January 2011 and December 2015 was done. A total of 41 traumatic cataract cases were seen during the 5-year period. Age, Sex, traumatic sequelae, surgical strategies, intraoperative complications and post-operative outcome were reviewed in all eyes.

**Results:** Records of forty-one patients with traumatic cataract were analyzed. Males accounted for 90.24%, while females, for 9.76%. Thirty-five patients (85.36%) underwent surgery for traumatic cataract. A history of blunt trauma was elicited in 23(56.09%) and 18(43.91%) had a penetrating trauma. It was noted that the presence of corneal changes or iris abnormalities, did not affect the visual outcome. Pupillary changes influenced the visual outcome, with 100% of the patients with a relative afferent pupillary defect and a fixed dilated pupil having a vision worse than CF3m. ( $p < 0.005$ ). Among the intraoperative complications, vitreous loss had a bearing on the post-operative vision. Twelve percent of the patients had a vitreous loss, all of whom had a vision of 6/60 or worse. ( $p = 0.028$ ). The presence of postoperative complications also affected the visual outcome-78.6% of whom, had a vision 6/24 or worse. ( $p = 0.05$ ).

**Conclusion:** Traumatic cataracts pose a challenge to ophthalmologists, as they have an increased incidence of associated ocular abnormalities and intraoperative complications. Hence, pre-operative counselling of the patient, astute surgical planning, careful surgical management and an intense post-operative follow up regime are imperative in the management of traumatic cataracts, to attain a reasonable visual outcome.

**Keywords:** Visual outcome, Blunt trauma, Penetrating trauma, Traumatic cataract.

### Introduction

Cataract is one of the common fallouts of ocular trauma. In a younger age group it may contribute to a significant burden on both the patient and the family. When the cataract affects the visual axis, its removal becomes imperative to restore vision.

The mode of injury- whether, penetrating or blunt, is instrumental in determining the type of cataract, the associated ocular features and the visual outcome.

Shah et al showed that in the rural setting, the cause of trauma can be varied, leading to variations in the intensity of ocular morbidity, and hence can determine when the patient seeks medical attention. They also proved that the time interval between the occurrence of injury and the surgical intervention determines the final visual outcome.<sup>(1)</sup>

Traumatic cataract management varies from the management of senile cataract and so does the prognosis. Despite a successful cataract surgery, these patients may have poor vision owing to trauma related ocular complications such as retinal detachment, glaucoma and others.<sup>(2)</sup> Trauma, in addition to causing lens opacity, can also lead to a change in the position of the lens, which increases ocular morbidity.<sup>(3)</sup>

Cataract surgery in the setting of trauma requires a detailed evaluation, planning and effective execution of the strategies in -order to achieve a reasonable vision in these patients.

Our study involves assessing the demographics of trauma, the pre-operative ocular characteristics, the intra-operative events, and the post-operative outcomes in patients who underwent cataract surgery.

### Materials and Methods

We conducted a review of files of 41 patients who had presented to our institution-MS Ramaiah Medical College Hospital- with a history of ocular trauma and associated defective vision. Data regarding age, sex, type of trauma, time interval between occurrence of trauma and its presentation, was collected. Examination included visual acuity, anterior segment evaluation with particular reference to the type of cataract, associated features of trauma in the cornea, iris and anterior chamber. A thorough posterior segment evaluation was done.

The events that ensued during the surgery -the type of surgery done, type of intra-ocular lens placed and whether or not an intraoperative complication occurred, and how it was managed were noted. The post op vision and complications were recorded.

The Statistical Package for the Social Sciences version 18.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. The chi square test was used and a p value less than 0.05 was considered statistically significant.

## Results

A retrospective analysis of all the traumatic cataracts presenting at M.S. Ramaiah Medical College Hospital from January 2011 to December 2015, was done. A total of 41 cases were treated during this period, out of which 6 were not operated due to nil visual prognosis or failure to obtain consent from the patient.

Of the 41 patients, 37(90.24%) were male and only 4(9.53%) females. The mean age at presentation was 42.59 years (range 4-80 years). Seven cases (16.66%) were walk-in patients to the OPD, whereas the rest 35 (83.33%), were identified on an outreach program.

The mode of injury was blunt in 23(56.09%) patients whereas it was of the penetrating type in the remaining 18 (43.91%). Of these, 21 patients with blunt trauma, and 14 with penetrating trauma underwent surgery.

The most common symptom that patients presented with was gradual loss of vision with all patients presenting with a painless loss of vision except one who had

uveitis and consulted for pain as the presenting symptom. 34(82.92%) patients had a vision of less than counting fingers 3m.

When the time interval between the occurrence of trauma and presentation was assessed it was seen that patients presented with traumatic cataract at a mean duration of 3.88 years (0-21 years). Those with blunt injury-13(56.52%) presented within a year while, 11(61.11%) with penetrating trauma presented within the first year. There was no difference between the type of injury and the time interval between occurrence of trauma and presentation with cataract.

There was a vision improvement of one line or more in 89.8 % of the patients, while only 45.92% had a post-operative vision of 6/18 or better. The post-operative vision in patients is shown in Table 1. There was no difference in visual outcome between the blunt and penetrating trauma groups (p value=0.578)

**Table 1: Post-operative vision**

Type of trauma	Total	6/18 and above	6/60 to 6/18	CF 3m to 6/60	<CF 3m
Blunt	22	11(52.3%)	4 (18.18%)	2 (9%)	4 (18.18%)
Penetrating	14	5 (35.7%)	3 (21.4%)	3(21.4%)	2 (14.2%)

Of all the cases, 22 cases (53.7%) had no corneal affection. The relation between the mode of injury and corneal involvement is shown in table 2. It was seen that

there was a higher frequency of corneal involvement in those with penetrating injury (p =0.001).

**Table 2: Corneal involvement in traumatic cataract**

Type of trauma	Total	No corneal affection	Central corneal opacity	Peripheral corneal Opacity	Others
Blunt	23	18 (78.2%)	2 (8.69%)	0	3 (13.04%)
Penetrating	18	4 (22.23%)	3 (16.67%)	9 (50%)	2 (11.12%)

When post-operative vision and corneal involvement were analyzed it was found that twelve (33.33%) of the patients with a normal cornea had vision of 6/18 or better, while 3(60%) with a central corneal opacity, had a vision of 6/18 or better. One (14%) with a peripheral corneal opacity had a vision of 6/18 or better. But, this was not found to be statistically significant.

The iris changes and their influence on post-operative vision are shown in Table 3 and it was seen that iris changes did not have any statistically significant effect on the visual outcome.

**Table 3: Iris changes and the post-operative vision**

Iris Changes	Total Number who underwent surgery	Patients with post-op vision >6/18
No Iris changes	21(58.34%)	11(52.4%)
With Iris changes	15 (41.67%)	5 (33.34%)
1) Posterior synechiae (8)		
2) Peripheral iris tears (5)		
3) Sphincter tear (1)		
4) Iridodialysis (1)		

When pupillary changes were analyzed, 25 (61%) had no pupillary changes, 9 (22%) had posterior synechiae, 4 (9.8%) had a relative afferent pupillary defect and 3 (7.3%) cases had a fixed dilated pupil. The type of trauma had a statistically significant effect on the pupillary abnormality with the penetrating type of injury affecting the pupil more often ( $p=0.059$ ). When the visual outcome post-surgery was assessed in these patients, 17(70.8 %) of the patients with a normal pupil had a vision of 6/60 or better, while 100 % of the patients with a relative afferent pupillary defect and a fixed dilated pupil had a vision worse than CF3m. ( $p < 0.005$ ). This helped

us deduce that presence of a pupillary abnormality can aid in prognosticating visual outcome in patients undergoing surgery for traumatic cataract.

Traumatic cataract morphology was studied and seen that total cataract was the predominant presentation with 31(75.6%) patients presenting with it, only 2 (5%) presented with membranous cataract and 3(7.3%) cases had rosette cataract.

Zonular weakness and its effect on the visual outcome is shown in table 4. It was seen that the presence or absence of subluxation did not affect the postop vision ( $p=0.996$ ).

**Table 4: Zonular weakness and its effect on Postop vision**

Zonular weakness	Total number*	Post-op vision $\geq 6/18$
Absent	31(75.6%)	12(48%)
Present	10(24.4%)	4(44.45%)
1. Phacodonesis (4)		
2. Subluxation <3 clock hours (2)		
3. Subluxation more than 3 clock hours (4)		

\*6 patients of the total did not undergo surgery

An intraocular lens was placed in 33 patients of which 28 (77.8%) had a rigid posterior chamber intraocular lens placed, while 2 (5.6%) had a foldable intraocular lens placed. Three (8.3%) patients had an iris claw lens placed.

Seventeen (81 %) of the patients who had suffered a blunt trauma and 9(75%) with a penetrating trauma had no intraoperative complications. Of the aforementioned

patients, 14(56%) had a vision of 6/18 or better, while only 2(25%) of those that had an intraoperative complication had a vision of greater than 6/18. The various intraoperative complications and their effect on the postop vision have been shown in table 5. Vitreous loss was noticed in 4 (11.7 %). All 4 of them had a vision worse than 6/60. This was found to be statistically significant ( $p=0.028$ )

**Table 5: Comparison of type of intra-operative complication and post-operative vision**

Type of complication	Number	Post op vision $\geq 6/60$
Posterior capsular rupture	3(8.8%)	0
Vitreous loss	4(11.7%)	0( $p=0.028$ )
Iris complication	2(5%)	2
Zonular dehiscence	5(14.7%)	3

When we analyzed the influence of age on intraoperative complications it was found that patients in the age group of more than 60 years had a higher (54.54%) rate of intraoperative complications. ( $p=0.021$ ). Hence, age was also found to have a negative impact on the postop visual outcome in patients with traumatic cataracts in our series.

Post op complications had a bearing on the post op vision ( $p=0.05$ ), with 78.6 % patients with a post op complication having a vision of 6/24 or worse, while only 35 % of those with no post-operative complication had a vision of 6/24 or worse.

## Discussion

Ocular injuries are one of the important causes of defective vision in the young, economically productive

population, and in children. Lenticular opacities occur in a considerable majority of these patients, ranging from 27-65 %.<sup>4</sup>

It has been shown that males are more predominantly affected, even among the paediatric population.<sup>(5)</sup> In our study too, we found a male preponderance of 90.24%.

Ram et al reported that 65% of their patients had a penetrating trauma while 35 % had suffered a blunt trauma.<sup>(6)</sup> In our study though, 56.09 % had a blunt injury, while 43.91 % had a penetrating injury showing a similar frequency of both modes of injury.

The time interval between trauma and cataract surgery and its effect on vision is debatable with few studies

showing that early intervention is important for an improved visual outcome, especially with an intra-ocular foreign body<sup>(7,8,9)</sup> while a similar number of studies refute this claim.<sup>(10,11,18)</sup> Smith et al also suggested that there was no difference in the visual outcome in patients receiving primary intraocular lenses as against those receiving a secondary intraocular lens.<sup>(19)</sup> We too found that the time interval between the onset of injury and time of intervention did not contribute to the visual prognosis. Most patients in our study were recognized in an outreach program and hence, they may have presented only after the onset of vision loss.

Visual improvement after traumatic cataract surgery is low compared to that following a senile cataract surgery owing to associated intraocular damage. Gradin et al reported a post-operative visual improvement of 6/12 or more in 64.7 % of cases.<sup>(5)</sup> In a study done by Blum et al,<sup>(12)</sup> they showed that visual acuity improved in 90 % of the eyes, while associated ocular complications such as involvement of the retina or the optic nerve deterred the vision improvement. Shah et al showed that presence of posterior capsular opacification also reduced the postop visual outcome.<sup>(16)</sup> Rupal et al showed that the incidence of posterior capsular opacification was more in patients who underwent surgery for a traumatic cataract.<sup>(17)</sup> In our study we noted a vision improvement of one line or more in 89.8 % of the patients, while only 45.92% had a postop vision of 6/18 or better. The presence of associated ocular damage, intraoperative and post-operative complications reduced the immediate postop vision in our series.

Wong et al. showed that people who reported trauma had a 50-70 % higher chance of having a cortical or posterior sub capsular cataract, as compared to those who did not.<sup>(13)</sup> Our findings, however were not in agreement with the aforementioned study with 31 (75.6%) patients presenting with total cataract and only 24.4% presenting with rosette or membranous cataract.

Anterior chamber shallowing and collapsing was seen as the most common intra-operative complication and was directly associated with the incidence of postop complications in the study conducted by Fyodorov et al.<sup>(14)</sup> In our series zonular dehiscence was the most common complication (14.7 %), and 80 % of them had post op complications.

We also found that patients with postop complications had poorer visual outcome. (p=0.05)

Kinori et al in their study showed that better vision at presentation and blunt injury were good prognostic factors.<sup>(15)</sup> Khokar et al proved that in paediatric cases too, blunt trauma was a good prognostic factor.<sup>(20)</sup> In our study too, it was established that a better preoperative vision had a bearing on the postoperative outcome. (p<0.005) But, the type of trauma did not determine the visual outcome. We found that patients with an abnormal pupil had a poorer visual prognosis (p <0.005).

## Conclusions

Trauma is an important cause of ocular morbidity and needs to be addressed whatever may be the time of presentation. Poor prognostic factors such as age, vision and pupillary changes at the time of presentation need to be looked for and its implications need to be explained to the patient.<sup>(21)</sup> Traumatic cataract surgery also carries a higher frequency of occurrence of both intra-operative and post-operative complications, which have to be anticipated and treated appropriately to achieve a reasonable visual outcome.

## References

1. Mehul A. Shah, Shreya M. Effect of interval between time of injury and timing of intervention on final visual outcome in cases of traumatic cataract., *Eur J Ophthalmology*.2011 Nov-Dec;21(6):760-5.
2. Bekibele CO, Fasina O. Visual outcome of traumatic cataract surgery in Ibadan, Nigeria, *Niger J Clin Pract*. 2008 Dec;11(4):372-5.
3. Lacmanović Loncar V, Petric I. Surgical treatment, clinical outcomes, and complications of traumatic cataract: retrospective study, *Croat Med J*. 2004 Jun;45(3):310-3.
4. Moisseiev J, Segev F, Harizman N, Arazi T, Rotenstreich Y, Primary cataract extraction and intraocular lens implantation in penetrating ocular trauma, *Ophthalmology*. 2001 Jun;108(6):1099-103.
5. Gogate P, Sahasrabudhe M, Shah M, Patil S, Kulkarni A. Causes, epidemiology, and long-term outcome of traumatic cataracts in children in rural India., *Indian J Ophthalmol*. 2012 Sep-Oct;60(5):481-6.
6. Ram, Jagat; Verma, Neelam; Gupta, Nishant. Effect of penetrating and blunt ocular trauma on the outcome of traumatic cataract in children in northern India; *Journal of Trauma and Acute Care Surgery*.September 2012,73(3):726-730.
7. Jonas JB, Knorr HL, Budde WM. Prognostic factors in ocular injuries caused by intraocular or retrobulbar foreign bodies. *Ophthalmology* 2000;107:823-8.
8. Jonas JB, Budde WM. Early versus late removal of retained intraocular foreign bodies. *Retina* 1999;19:193-7.
9. Yang CS, Lu CK, Lee FL, Hsu WM, Lee YF, Lee SM. Treatment and outcome of traumatic endophthalmitis in open globe injury with retained intraocular foreign body. *Ophthalmologica* 2010;224:79-85.
10. Woś M, Mirkiewicz-Sieradzka B. Traumatic cataract: treatment results. *Klin Oczna* 2004;106:31-4.
11. Behbehani AM, Lotfy N, Ezzdean H, Albader S, Kamel M, Abul N. Open eye injuries in the pediatric population in Kuwait. *Med Princ Pract* 2002;11:183-9.
12. Blum, Marcus et al. Treatment of traumatic cataracts. *Journal of Cataract & Refractive Surgery*, Volume 22, Issue 3,342-346.
13. Wong TY, Klein BEK, Klein R, Tomany SC. Relation of ocular trauma to cortical, nuclear, and posterior subcapsular cataracts: the Beaver Dam Eye Study. *The British Journal of Ophthalmology*. 2002;86(2):152-155.
14. Fyodorov SN, Egorova EV, Zubareva LN. 1004 cases of traumatic cataract surgery with implantation of an intraocular lens. *J Am Intraocul Implant* 1981 Apr;7(2):147-53.
15. Kinori M, Tomkins-Netzer O, Wygnanski-Jaffe T, Ben-Zion I, Traumatic pediatric cataract in southern Ethiopia—results of 49 cases. *Journal of American Association for*

- Pediatric Ophthalmology and Strabismus*, October 2013, Volume 17, Issue 5,512-515.
16. Mehul A Shah, Shreya M Shah, Krunal D Patel, Ashit H Shah, and Jaimini S Pandya, Maximizing the visual outcome in traumatic cataract cases: The value of a primary posterior capsulotomy and anterior vitrectomy, *Indian J Ophthalmol*. 2014 Nov; 62(11):1077–1081.
  17. Posterior capsule opacification in pediatric eyes with and without traumatic cataract Rupal H. Trivedi, M. Edward Wilson, *Journal of cataract and refractive surgery*, July 2015 Vol. 41, Issue 7, Pages 1461-1464.
  18. Tabatabaei SA, Rajabi MB, Tabatabaei SM, Soleimani M, Rahimi F, Yaseri M, Early versus late traumatic cataract surgery and intraocular lens implantation. *Eye (Lond)*. 2017 Apr 14, doi: 10.1038/eye.2017.57.
  19. Michael P. Smith, Marcus H. Colyer, Eric D. Weichel, Richard D. Stutzman, Traumatic cataracts secondary to combat ocular trauma, *Journal of Cataract and Refractive Surgery*, August 2015, Vol. 41, Issue 8, Pages 1693-1698.
  20. Khokhar S, Gupta S, Yogi R, Gogia V, Agarwal T, Epidemiology and intermediate term outcomes of open and closed globe injuries in traumatic childhood cataract, *European Journal of Ophthalmology*, July 2013,24(1):124-130.
  21. Moreschi C, Da Broi U, Lanzetta P, Medicolegal Implications of traumatic cataract, *Forensic Legal Medicine*, 2013 Feb;20(2):69-73.