

# Surgical Outcome of Traumatic Cataract Following Corneal Perforation in Children in a Tertiary Eye Care Centre in Nepal

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#### Abstract

**Introduction:** Traumatic paediatric cataract is challenging and its management is difficult. It is associated with other distortion of ocular anatomy and subsequent post-operative complication poses more problems. It is mostly unilateral. The purpose of this study is to assess the outcome of traumatic cataract following corneal perforation in Nepalese children in a tertiary eye hospital in Nepal. **Material and Methods:** It was a retrospective review of medical records of children who developed cataract following perforating corneal injuries. The study included 69 cases diagnosed as unilateral traumatic cataract over a period of 70 months (January 2010 till October 2015) at Tilganga Institute of Ophthalmology (TIO). Traumatic cataracts caused by other than the perforating corneal injuries were excluded from the study. **Results:** Children between 6 to 10 years of age had highest percentage of ocular trauma. Boys were more commonly affected than girls. Forty two percentages of children had visual outcome of better than or equal to 6/18. Poor visual outcome was mainly due to anterior segment pathology- corneal scar (14.49%). Posterior segment pathology like macular scar, vitreous haemorrhage and retinal detachment contributed to 7.34% of the cause. **Conclusion:** Outcome of the traumatic cataract surgery varied. Visual outcome of post traumatic cataract after corneal perforation was dependent on multiple factors like co-existence of the anterior and posterior segment trauma, pre-operative and post-operative challenges. Prompt and good management of traumatic cataract can result in good visual outcome.

**Key words:** Intra-ocular lens (IOL), Traumatic cataract, Traumatic cataract Surgery

#### Introduction

Traumatic pediatric cataract is challenging and its management is more difficult. It is mostly unilateral. It is associated with other distortion of ocular anatomy and subsequent post-operative complication poses more problems. It is one of the causes of the unilateral blindness due to lack of awareness in the community.

Bow and arrow injury caused the maximum cases of traumatic cataract in different studies. Incidence of traumatic cataract in children is reported as high as 29% of all childhood cataracts. It causes additional burden to the eye health care system of country<sup>1-3</sup>. The prompt and good management of traumatic cataract by pediatric ophthalmologist can result in good visual outcome<sup>4,5,6</sup>.

The aim of this study was to assess the outcome of traumatic cataract following corneal perforation in Nepalese children at TIO, Nepal.

## Material and Method

It is the retrospective hospital based study. The study includes 69 cases diagnosed as unilateral traumatic cataract over a period of 70 months (January 2010-October 2015) at TIO following corneal perforation. Cause and type of trauma, demographic factors, surgical intervention, complications, and visual acuity were recorded. Those cases which developed the cataract apart from corneal perforation were excluded from the study. The details were obtained from the operation register and outpatient department (OPD). Best corrected preoperative and post operative visual acuity, intra operative, and postoperative complications were analyzed for all eyes. Children attended TIO either in emergency or OPD. All the children had a full ocular examination performed by two paediatric ophthalmologists.

Visual acuity was recorded in all the children. All the children were examined on the slit lamp microscope and by direct and indirect ophthalmoscopy after pupil dilatation as per need of the case. In preverbal children anterior segment examination was done by the hand held slit lamp. B scan ultrasound was done in children to rule out the posterior segment pathology.

*Surgical technique:* All the surgery was performed under general anaesthesia by two paediatric ophthalmologists 4-6 weeks after the corneal perforation repair<sup>7,8</sup>. Intra-ocular lens (IOL) power calculations were done under general anesthesia. Management of the traumatic cataract was lens aspiration with or without anterior vitrectomy, and with or without intra-ocular lens (IOL) implantation. Anterior vitrectomy was done in all children below 8 years of age. Children were left aphakic if the posterior capsule support was insufficient due to trauma.

## Results

Total of 69 cases underwent the traumatic cataract surgery in 70 months time period. Children between 6 to 10 years of age had highest percentage of trauma than the other two groups (Table 1).

Majority of the patients (94 %) had pre-operative visual acuity of less 3/60 (Table 2).

Out of the 69 children, nine patients were advised to follow up in the nearest eye hospital immediately after the surgery. Forty two percentages of children had good visual outcome of better than or equal to 6/18. Fourteen percent of children had poor vision of less than 3/60.

Perforating corneal injuries were the cause of corneal trauma and subsequent traumatic cataract (Table 3). In this study, 43% of the children developed corneal perforation and traumatic cataract, due to wooden and vegetative material. Only one child with a history of fall from height developed corneal trauma and subsequent traumatic cataracts. Rest of the traumatic cataract was invariably due direct perforating injuries

In this series 5 (7.24%) cases had ruptured anterior capsule. Only one case (1.44%) had pre-existing posterior capsular tear. Regarding the type of cataract, 61 (88.4%) was total cataract. Posterior sub capsular cataract was present in two cases (2.89%); one was subluxated (1.44%).

In this study 82% of the children with traumatic cataract, underwent IOL implantation (Table 4).

Out of those, only 2.89% of the cases had pupillary capture in Poly methyl methacrylate (PMMA) intraocular lens ( IOL).

The visual outcome of the traumatic cataract was affected by trauma and various post-operative factors (Table 5 and 6). One child (1.44%) underwent the dialling of superiorly displaced PMMA IOL. Visual axis opacification (VAO) developed in 8.69% of the children. Out of those, YAG laser was done in 7.24% of the children.

**Table 1:** Age of the children with traumatic cataract

Age	Number	Percentage	
0- 5 years	16	23.18%	
6- 10 years	37	53.62%	$p > 0.05$
11 to 15 years	16	23.18%	
<b>Total</b>	<b>69</b>	<b>100%</b>	

**Table 2:** Pre –operative Visual acuity of the children undergoing the traumatic cataract surgery

	Number (n=69)	Percentage (%)
No perception of light ( NPL)	1	1.44%
Perception of light(PL) and Hand movement (HM)	52	75.36%
<3/60	12	17.39%
6/36	2	2.89%
6/24	2	2.89%

**Table 3:** Showing Cause of perforating corneal injury

	Number (n=69)	Percentage (%)
Wooden stick	19	27.53%
Bamboo	3	4.34%
Thorn	5	7.24%
Vegetative material : Pumpkin stump	3	4.34%
Khukuri	1	1.44%
Needle	5	7.24%
Arrow	2	2.89%
Metal piece	4	5.79%
Pencil	6	8.69%
Catapult	1	1.44%
Stone	2	2.89%
Steel	1	1.44%
Rubber	1	1.44%
Ball	1	1.44%
Hand	1	1.44%
Fire cracker	1	1.44%
Buffalo's horn	1	1.44%
Fall from height	1	1.44%
Unknown	11	15.94%
<b>Total</b>	<b>69</b>	<b>100%</b>

## Discussion

In this study, 42% of children had good visual outcome of better than or equal to 6/18. Boys were more commonly affected than girls due to the outdoor activities. This finding is consistent with other studies from India and Nepal<sup>9,10,11</sup>. In this study, 82% of the children underwent IOL implantation. The less percentage of the pupillary capture may be because of in the bag implantation.

Incidence of VAO in children with traumatic cataract has been reported between 21–100%. The rate of VAO was less (8.69%) compared to these reports, probably because anterior vitrectomy was done in all cases. In

**Table 4:** Primary versus secondary IOL implantation.

	Number (n=69)	Percentage (%)
Aphakic	12	17.39%
Foldable IOL	17	24.63%
PMMA	34	49.27%
Secondary IOL	6	8.69%
<b>Total</b>	<b>69</b>	<b>100%</b>

**Table 5:** Squeal of corneal perforating injury

	Number (n=19)	Percentage (%)
Corneal scar	10	14.49%
Exotropia	3	4.34%
Esotropia	1	1.44%
Macular scar	1	1.44%
Retinal Detachment	1	1.44%
Vitreous Hemorrhage	2	2.89%
Retinal detachment and Vitreous Hemorrhage	1	1.44%

**Table 6:** Post- operative complications of traumatic cataract surgery

	Number (n=14)	Percentage (%)
Visual axis opacification	6	8.69%
Membrane over the IOL	2	2.89%
Pupillary capture	2	2.89%
Reposition of superiorly displaced IOL	1	1.44%
Glaucoma	1	1.44%
Endophthalmitis	2	2.89%

cooperative children (7.24%) who developed VAO, YAG capsulotomy was done. None of the children needed membranectomy.

None of the children developed uveitis in this study. The rate of the endophthalmitis was 2.89%. One of the child developed traumatic endophthalmitis, nine days after the lens aspiration, anterior vitrectomy and PMMA IOL. This child had history of trauma with pencil.

Another child had delayed onset endophthalmitis, five months after the lens aspiration and IOL implantation. This child had history of trauma with bamboo. There was no growth in the vitreous and aqueous tap. This child had VA of 6/6.

**Age and gender of child:** The earlier the management of children, the better is the outcome. Stimulation deprivation amblyopia can be prevented by early management. Younger patients respond well to treatment. In some studies very young children had poorer outcome. In other studies, age was not a significant variable affecting visual acuity. Majority of children were of the school-going age group<sup>9</sup>.

**Causes of perforating injury:** Visual acuity did not differ significantly between patients with cataract after the non-perforating and perforating trauma in one of the studies. In a study done in rural community and tribal belt in India and Nepal, injury by wooden sticks and sharp thorns were the most common causes of traumatic cataract. Wooden sticks were used as firewood and many children, were involved in helping their parents in collecting them<sup>12</sup>. 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 crackers<sup>13</sup>.

**Bow and arrow injury** caused the maximum cases of traumatic cataract; cataract extraction resulted in significant visual improvement; and closed globe injuries tended to have better prognosis in paediatric traumatic cataracts. Postoperative complications included amblyopia (51%) and visual axis opacification (VAO) (12%)<sup>14</sup>. The common modes of injury in the penetrating group were wooden splinters in 30.8% and bow and arrow in 15.4%. Firecrackers and trauma during play with ball were seen in 34%<sup>15</sup>. Satisfactory visual outcome can be achieved in children with traumatic cataracts; with no significant difference found among open- and closed-globe injuries in the pediatric age group<sup>16</sup>. Children with corneal trauma due to the sharp objects have good prognoses, probably due to less corneal injury. If traumatic cataracts in children are managed promptly and appropriately, visual outcome is good.

**Type of cataract and anterior and posterior capsule state:** In the study done in tertiary eye care of Eastern Nepal, 74% of the eyes had total cataract, 26% partially absorbed cataract, 26% had pre-existing posterior capsule defect, 7% had ruptured anterior capsule<sup>17</sup>. In 87 (76.3%) eyes, the cataract was total and 27 (23.7%) had partially absorbed cataracts. Ruptured anterior capsule was evident in 6 (5.3%) and that of posterior capsule in 12 (10.5%) at BP Koirala Institute of Health Sciences between 1998-2001<sup>18</sup>.

**Anterior segment state:** Any anterior segment pathology will directly affect the outcome of the traumatic cataract surgery. Corneal scars, adherent leucoma, change of refractive status results in poor outcome. Corneal scar was present in highest percentage of the cases in this study.

Age and timing of traumatic cataracts surgery is important factor in traumatic cataract. In children to prevent stimulation deprivation amblyopia, surgery is done as soon as possible. The rate of post-operative inflammation, uveitis, pupillary capture and VAO is reduced.

In this study, the children were operated for the traumatic cataract surgery within 4 to 6 weeks after the attendance in the hospital. The median time interval between injury and presentation to the hospital was only 4 days<sup>19, 20, 21</sup>.

**Variation in Surgical method:** Surgery in traumatic paediatric cataract is difficult. Moreover, traumatic cataract is more challenging. It is recommended that the traumatic cataract surgery should be done in quiet eyes. The normal anatomy of child's eye is distorted. Adherent leucoma or corneal scars causes the hindrance in observation of the cataract, posterior capsule and vitreous. Anterior chamber may be shallow or of irregular depth. Iris prolapse may be associated. Pupil may be irregular, poorly dilating. Spinchtherotomy may be necessary. In tough anterior capsule, capsulorhexis was not possible. Due to adherence of anterior capsule to posterior capsule in partially absorbed cataract, anterior capsulotomy was difficult.

**IOL: Primary versus secondary IOL implantation:** Implantation of IOL is commonly practiced in traumatic cataract<sup>15</sup>. Primary IOL implantation is preferred<sup>22</sup>. Out of those, 49% of children had PMMA IOL implantation. Secondary IOL implantation (8.69%) was done, only if the visual acuity improved with the aphakic glasses. Contact lenses and aphakic glasses are other alternative. However, contact lenses are unaffordable in Nepalese economy.

### **VAO, YAG and Membranectomy:**

**Uveitis:** In children there is a greater chance of post operative inflammation due to fibrinotic reactions. In 2.89 % of the children, membrane was seen anterior to the IOL. Intense topical and

oral anti-inflammatory corticosteroid medication was advised. Children have easily disruptable immature blood aqueous barrier and low inherent fibrinolytic activity. It encourages the release of plasma proteins, clotting factors and fibrin into the anterior chamber. This is more so in traumatic cataract<sup>23,24,25</sup>. Severe inflammation and post-operative uveitis is managed by frequent application of topical antibiotic and steroid drops.

Endophthalmitis and intravitreal injection: Post – traumatic endophthalmitis is common in corneal perforation. Unless managed promptly, with intravitreal antibiotic injection the outcome of the traumatic cataract surgery has poor prognoses.

Posterior segment status: Macular pucker, scar, retinal detachment is the other causes of poor visual outcome. Visual acuity 42% of children had good visual outcome of better than or equal to 6/18. Poor visual outcome was mainly due to anterior segment pathology -corneal scar (14.49%). Posterior segment pathology like macular scar, vitreous hemorrhage and retinal detachment contributed to 7.34% of the cause. This is similar to other studies where the cause of poor visual acuity (less than 6/18) in 64.4% of the subjects included cornea opacity 12.5%, posterior capsule opacification 12.5%, retinal detachment 9.4%, and glaucoma 6.9%. Because, it is not only the lens which decides prognosis, different types of management are done in different post-operative outcome<sup>26,27</sup>. Gradin *et al.* reported that 64.7% had vision better than 20/60 after surgery

for traumatic cataract. Aldakaf *et al.* and Sternberg *et al.* reported that initial vision and mechanism of injury were predictors of final outcome. Evaluation of visual outcome in traumatic cataract and adult cataract are similar, but the co-morbidity, causes the difference in success rates<sup>28</sup>. This statement is true for traumatic cataract in children.

## Conclusion

Outcome of the traumatic cataract surgery varied. Visual outcome of post traumatic cataract after corneal perforation is dependent on multiple factors like co-existence of the anterior and posterior segment pathology, pre-operative and post-operative challenges. Forty two percentages of children had good visual outcome of better than or equal to 6/18.

Prompt and good management of traumatic cataract can result in good visual outcome. Poor visual outcome was mainly due to anterior segment pathology -corneal scar (14.49%).

## Recommendation

Awareness among the parents and community about the hazards should be created. In addition to that, community should be informed that in any ocular injury, children should be taken to nearest eye hospital. Regular post operative follow up of children should be encouraged for the management of traumatic cataract. The prompt and good management of traumatic cataract can result in good visual outcome.

## References

- Panda A, Bhatia IM, Dayal Y. Ocular injury – a socioeconomic importance. *Afro Asian Ophthalmol* 1985; 3: 172-4.
- Mundada R, Shinde S, Pathan MS, Badaam KM. Traumatic Cataract Epidemiology at Tertiary Care Hospital in Aurangabad Maharashtra India: An Observational Study: *Int J recent trends in Sci and Technol* 2014;9(3);403-405
- Eckstein M, Vijayalakshmi P, Killedar M, Gilbert C, Foster A. Aetiology of childhood cataract in South India. *Br J Ophthalmol* 1996;80:628–32.
- Zetterström C. Intraocular lens implantation in the pediatric eye. *J Cataract Refract Surg.* 1997;23:559–600.
- Metge P, Cohen H, Chemila JF. Intracapsular implantation in children. *Eur J Implant Refract Surg* 1990;2:319–23.
- Wilson ME, Peterseim MW, Englert JA, Lall-Trail JK, Elliott LA. Pseudophakia and polypseudophakia in the first year of life. *J AAPOS.* 2001; 5: 238–45.
- Brar GS, Ram J, Pandav SS, Reddy GS, Singh U, Gupta A. Postoperative complications and visual results in unocular pediatric traumatic cataract. *Ophthalmic Surg Lasers.* 2001; 32:233–8.
- XuYN, HuangYS, XieLX. Pediatric traumatic cataract and surgery outcomes in eastern China: a hospital-based study. *International Journal of Ophthalmology* 2013; 6(2):160-164.
- 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;60:481-6
- Reddy AK, Ray R, Yen YG. Surgical intervention of traumatic cataracts in children: Epidemiology, complications and outcomes. *J AAPOS* 2009;13:170-4.

11. Adlina AR, Chong YJ, Shatriah I. Clinical profile and visual outcome of traumatic paediatric cataract in suburban Malaysia: a ten-year experience. *Sing Med J* 2014;55(5):253-6
12. Khattry SK, Lewis AE, Schein OD, Thapa MD, Pradhan EK, Katz J, et al. The epidemiology of ocular trauma in rural Nepal. *Br J Ophthalmol* 2004;88:456-60.
13. Witsaman RJ, Comstock RD, Smith GA. Pediatric firework related injuries in the United States 1990-3. *Pediatrics* 2006;118(1):296-303
14. Khokar S, Gupta S, Yogi R, Gogia V, Agrawal T. Epidemiology and intermediate-term outcomes of open and closed globe injuries in traumatic childhood cataract. *Eur J Ophthalmol* 2014;24(1):124-30
15. Ram J, Verma N, Gupta N, Chaudhary M. Effect of penetrating and blunt ocular trauma on the outcome of traumatic cataract in children in northern India. *J Trauma Acute Care Surg* 2012;73(3):726-30
16. Shah MA, Shah SM, Applegate AH, Patel KD, Rehman RM, Shikhange KA. Visual outcome of traumatic cataract in pediatric age group. *Eur J Ophthalmol* 2012;22(6):956 – 63.
17. Panda A, Kumar S, Das H, Badhu BP. Striving for the Perfect Surgery in Traumatic Cataract following Penetrating Trauma in a Tertiary Care Hospital at Eastern Nepal. *J Nepal Med Assoc* 2007;46(167):119-25
18. Kumar S, Panda A, Badhu BP, Das H. Safety of Primary Intraocular lens Insertion in Unilateral Childhood traumatic cataract. *J Nepal Med Assoc* 2008;47(172):179-85
19. Gogate P, Khandekar R, Srisimal M, Dole K, Taras S, Kulkarni S, et al. Cataracts with delayed presentation- are they worth operating upon? *Ophthalmic Epidemiol* 2010; 17:25-33.
20. Kuhn F. Traumatic cataract: what, when, how. *Graefes Arch Clin Exp Ophthalmol* 2010;248:1221-23
21. Rumelt S, Rehany U. The influence of surgery and intraocular lens implantation timing on visual outcome in traumatic cataract. *Graefes Arch Clin Exp Ophthalmol* 2010; 248:1293-97.
22. Shrestha UD. Cataract surgery in children: Controversies and practices. *Nepal J Ophthalmol* 2012;4(7):138-49
23. Angra SK, Ahmed A, Panda A, Vajpayee RB. Role of low molecular weight heparin in paediatric cataract surgery. *Visuscan* 1996;5:47-54.
24. Bekibele CO, Fasina O. Visual outcome of traumatic cataract surgery in Ibadan, Nigeria. *Niger J Clin Pract* 2008;11:372–5.
25. Mohammadpour M, Jafarinasab MR, Javadi MA. Outcomes of acute postoperative inflammation after cataract surgery. *Eur J Ophthalmol* 2007;17:20–8.
26. Bekibele CO, Fasina O. Visual outcome of traumatic cataract surgery in Ibadan, Nigeria. *Niger J Clin Pract* 2008;11(4):372-5.
27. Shah M, Shah S, Gupta L, Jain A, Mehta R. Predictors of visual outcome in traumatic cataract. *World J Ophthalmol* 2014;4(4):152-59.
28. Shah MA, Shah SM, Shah SB, et al. Morphology of traumatic cataract: does it play a role in final visual outcome? *BMJ Open* 2011;1:e000060.