Striving for the Perfect Surgery in Traumatic Cataract following Penetrating Trauma in a Tertiary Care Hospital in Eastern Nepal

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ABSTRACT

This study analyzes the result of traumatic cataract surgery in a tertiary care hospital at eastern Nepal.

It is a hospital-based study of 112 patients (age 15-62), who underwent cataract extraction for unilateral traumatic cataracts. The study was carried out to evaluate the surgical outcome of tramatic cataract.

Thirty-eight eyes had associated posterior capsular defect. No serious postoperative complications were encountered. Posterior capsular opacification at the end of sixth week was evident only in two eyes. Best corrected visual acuity nof 6/18 or more at the eighth week was achieved in 61 (54%) eyes. Astigmatism of less than 3D was achieved in 82 (73%) eyes.

Rational surgical approach in traumatic cataract provides encouraging results. To comment on actual outcome long term follow up is mandatory.

Key Words: *Cataract, Penetrating Trauma, Eastern Nepal*

INTRODUCTION

Ocular injury remains as one of the important factor for uniocular blindness all over the world.[1] Development of cataract following either blunt or perforating trauma is a common occurrence. Visual outcome is not dependent on type of trauma (perforating/non perforating).[2] Extracapsular cataract extraction and posterior chamber intraocular lens (IOL) implantation would be the gold standard of visual rehabilitation in such eyes.[3-13] These cataracts are usually associated with iris tissue loss, sphincter tear, anterior and posterior capsular defects, absorbed lens besides posterior segment pathology. The surgical plan and choice of IOL insertion should be performed accordingly.[14-16] The type of trauma, extent of lenticular damage and associated secondary rise of intraocular pressure (IOP) often guide about the time of intervention. Further, eyes with posterior segment pathology require early cataract surgery.

Thus, in absence of any acute problem, surgical intervention within six months has been advocated. This prospective clinical study was conducted to highlight the modes of management and outcome of traumatic cataract in a tertiary care centre of eastern Nepal.

MATERIALS AND METHODS

Data were collected prospectively on a 112 consecutive series of uniocular traumatic cataracts undergoing cataract extraction with/without IOL implanation at B.P. Koirala Institute of Health Sciences, Nepal from April 1998 to March 2002. Details regarding age, duration of trauma, preoperative eye status, type of cataract surgery and visual outcome were recorded. Complete clinical eye

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examination included slit lamp biomicroscopy, macular function tests, ultrasonography, visuometry, keratometry and record of IOP. Corneal opacity involving central 5 mm of cornea, vitreous haemorrhage, retinal detachment were excluded from the study. Only the eyes that underwent surgery at a later date (minimum three months following trauma) were recruited. Eyes with raised intraocular pressure were evaluated for primary glaucoma by examining the contralateral eye. Such eyes were not included if diagnosed as primary glaucoma. In all, cataract extraction with/without IOL insertion was performed. Of 112 patients 25 (22.5%) were operated under general anesthesia and 87 (77.25%) under peribulbar anesthesia. For the later group of patients preoperative softening of the eye was obtained using a balloon to minimize the posterior pressure. Eyes with raised intraocular pressure received pre operative intravenous mannitol for pressure reduction. Sclerocorneal tunnel was made for surgical maneuver. Methyl cellulose 2% was used as viscoelastic. Synaechiolysis was performed for existing posterior synaechie using a cystitome prior to capsulotomy. Either continuous tear, can opener or envelope type of capsulotomy was performed depending upon the posterior vitreous pressure. In twelve eyes, anterior capsulotomy was performed with vitrectomy probe. Hydrodissection was performed by injecting balanced salt solution under the anterior capsular edge which permitted small nuclei expression. A 6.0 mm PMMA rigid posterior chamber IOL was inserted in the bag. If a pre-existing tear in the posterior capsule was observed during the procedure, the aspiration was carefully conducted by dry method or anterior vitrectomy was performed. This was followed by either a 6.0 mm PMMA rigid posterior chamber lens in the bag or ciliary sulcus, depending upon the size and the margin of the defect. If the defect was large, a 6 mm PMMA anterior chamber IOL was inserted. If there was a large iris defect and or lack of posterior capsular support, no IOL was inserted. The power of IOL was calculated by SRK II formula by using the pre-operative axial length and keratometry values. One to two interrupted 10-0 monofilament sutures with buried knots were applied. Placement and tension of the sutures were keratometry dependent. Viscoleastic was washed at the end of surgery and deep anterior chamber was ensured with injection of balanced salt solution and occasionally with air. Patching of eye after subconjuctival injection of dexamethasone and gentamicin completed the surgery. Post operatively all patients were treated with topical 0.1% Betamethasone drops two hourly and 0.3% ciprofloxacin drops four times a day. All patients were discharged on first postoperative day and were followed up after one week, 6 weeks or more frequently if indicated.

RESULTS

The mean age of the patients was 29.48 ± 15.26yrs (range, 15-62 years) (M = 29.08 ± 15.1yrs, F = 30.28 ± 14.5yrs). The male female ratio was 2.5:1. (Table 1).

Duration of trauma prior to cataract surgery was varying (Figure 1).

In 84 (74%) eyes the cataract was total and 38 (26%) eyes had partially absorbed cataracts. Seven eyes revealed ruptured anterior capsule and as high as 38 (26%) eyes showed preexisting posterior capsular defect (Figure 2).

The shape of posterior capsular defect was circular in 8 (21%) and irregular in 30 (79%). The size of defect (Table II) was <4 mm in 9 (24%), 4-6mm in 23 (60%) and 6 eyes (16%) had more than 6mm defect.

Similarly the margins of defect was fibrosed in 14 (37%) and non fibrosed in 24 (63%) (Table 2). In 25 eyes anterior vitrectomy was required due to large posterior defect in 24 and posterior capsular rupture due to positive pressure in 1. Anterior chamber IOL was inserted in 13 and no IOL implantation was done in 12 either due to non availability of the consent or non availability of accurate power anterior chamber IOL in these 25 eyes. Rest 87 eyes had posterior chamber IOL implantation (Figure 3).

Post operative complications were as highlighted in Table 3.

Table 1. Traumatic cataract: Age & Gender Variation (n = 112)

Age in years	M	F	Total
15-24	19	8	27
25-34	23	12	35
35-44	19	5	24
45-54	12	7	19
>54	6	1	7
Mean age	29.48 ± 15.26	29.08 ± 15.1	30.28 ± 14.5

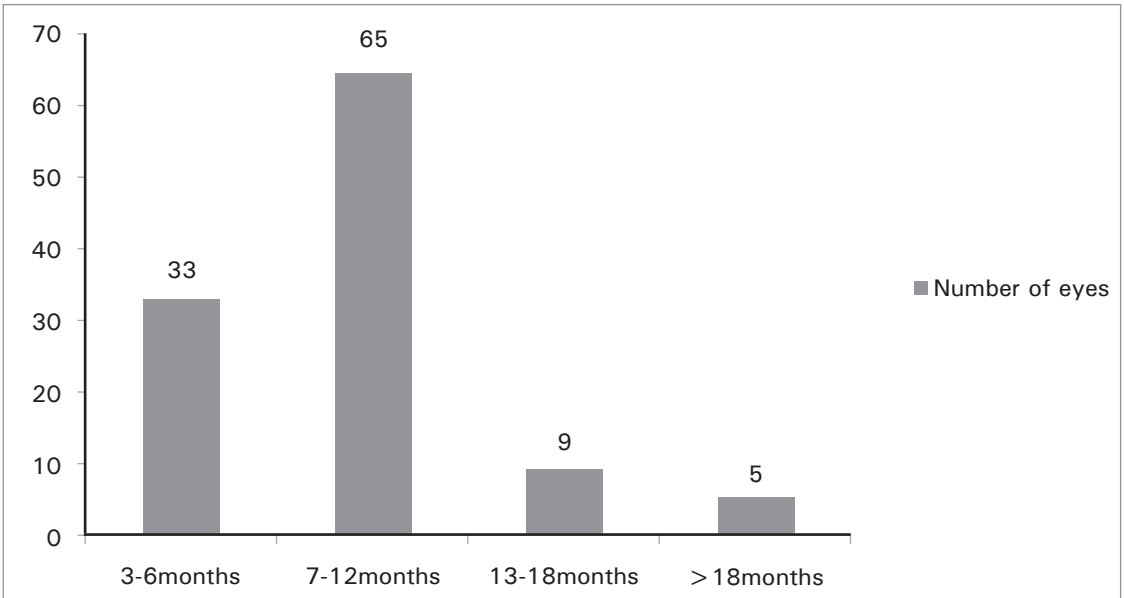

Figure 1. Traumatic cataract: Duration of trauma prior to cataract surgery (n = 112)

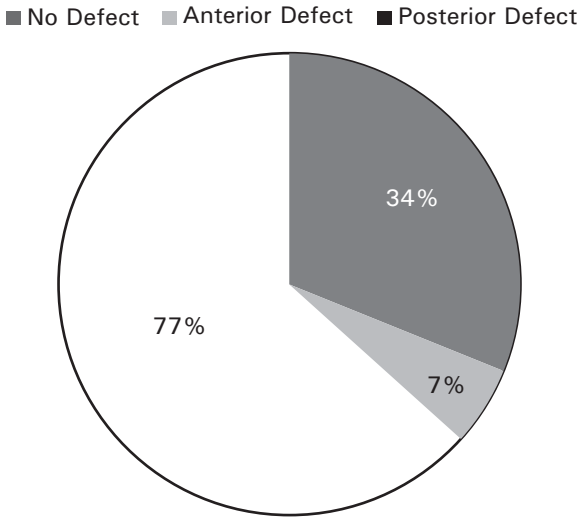

Figure 2. Traumatic cataract: Capsular defects (n = 112)

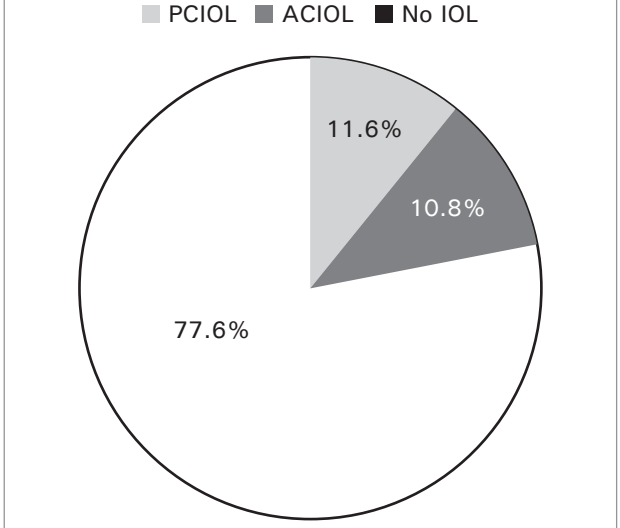

Figure 3. Traumatic cataract: Type of IOL inserted (n = 112)

Table 2. Trumatic cataract: Type of posterior capsular defect N = 38	
SHAPE	
Circular	8 (21%)
Irregular	30 (79%)
SIZE	
<4mm	9 (24%)
4-6mm	23 (60%)
>6mm	6 (16%)
MARGINS	
Fibrosed	14 (37%)
Non fibrosed	24(63%)

The visual acuity unaided, with pinhole and with refractive correction at discharge and at eighth weeks (two weeks after suture removal) were elaborated in Table 4.

Type of astigmatism is highlighted in Figure 4.

The causes of non improvement of vision are depicted in Table 5.

Table 3. Traumatic cataract: Post operative complications (n = 112)

Complications	Immediate at discharge	At 6 week
Corneal oedema	13	2
Hyphaema	3	-
Vitreous in AC	11	7
Mild Uveits	98	-
Severe Uveits	14	1
Pulpillary Capture	6	12
IOL Tilted	2	1
IOL deposits	2	-
Raised IOP	1	2
Posterior capsular opacification	-	2

Table 4. Traumatic cataract: Visual acuity (n = 112)

Visual Acuity	Functional acuity* Uncorrected visual acuity (UCVA) at discharge	Corrected visual acuity at 8 weeks	Best corrected visual acuity (BCVA)+ at 12th weeks
< 3/60	12	3	1
6/60-6/60	47	12	10
6/36-6/24	30	43	23
6/18-6/12	14	59	69
Total	112	112	112

* Functional acuity is the vision in the operated eye without any optical correction.

\+ Best corrected visual acuity is the vision in the operated eye with full correction of refractive error

Table 5. Traumatic cataract: Causes of non-improvement of vision

Factors	< 3/60	3/60-6/60	6/36-6/24
After cataract		-	5
High astigmastism		2	7
Pigment dispersal on anterior surfact of IOL		-	2
Retinal detachment	-	1	-
Vitreous opacity	-	1	4
Glaucoma	1	1	1
Macular scarring	-	3	2
Endophthalmitis	-	1	1
Amblyopia		-	1
Corneal ulcer	-	1	-
Total	1	10	23

DISCUSSION

The occurrence of corneal opacity with associated cataract following penetrating injuries is common.[17,18] Lenticular damage, usually unilateral, is the most common complication that causes visual loss after any type of trauma.[18] This is more profound among the young age group where cataract remains monocular for years. Ironically occurrence of trauma is more prevalent in younger population due to their involvement in outward activities and engagement in work place.[19-21] Traumatic cataract with/without corneal opacity in adult population though does not give rise to amblyopia but reduces physical activity and produces psychological trauma.[10,22-24] Optimal early visual rehabilitation in such patients is a matter of concern.[9,15] Ideally these patients require a simultaneous penetrating keratoplasty with simultaneous cataract extraction along with intraocular lens implantation. Presence of central corneal opacity in traumatized eyes is the absolute indication of keratoplasty. In midperipheral opacity though the opacity per se does not obstruct the visual axis, after cataract surgery, the sub optimal vision may be due to extensive astigmatism. Moreover, keratoplasty with lens removal is not always indicated in these eyes as some time a large central graft is required which is not desired for optical keratoplasty. Paucity of donor tissue in most of the developing countries and limitation for constant and intensive ophthalmic care limit the performance of keratoplasty. Therefore, a single procedure such as cataract extraction with IOL implantation followed by suturing modulation is called for rapid and optimal visual rehabilitation especially for patients with peripheral/midperpheral opacities with traumatic cataract.

Often, these patients poses certain difficulty for ophthalmic surgeons in the form of associated posterior capsular defect, membranous/partially absorbed cataract, more postoperative inflammation and more chances of postoperative complications. Further, there is great chance of damaging the posterior capsule during can opener anterior capsulotomy in partially absorbed cataracts, even in the absence of preexisting posterior capsular defects due to closeness of anterior capsule to posterior capsule. Therefore, we advocate envelope technique of capsulotomy[25] in all such eyes followed by injection of viscoelastic substance in it. This also helped in eyes with associated posterior capsular defects.

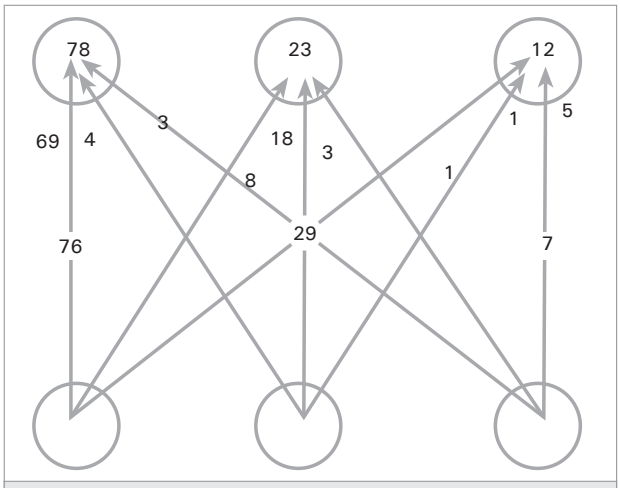

Figure 4. Traumatic cataract: Pre and Post operative astigmatism

It is mandatory to find out the accurate defect preoperatively. B-Scan ultrasonography is an effective tool to evaluate the pre-existent defect precisely.[26-27] Further, ultrasonography guides the surgeon for proper planning of surgery by accessing the associated damage to the posterior segments. Moreover, it also helps to assess the extent of absorption of the lens. All these help in planning the surgery making the patient aware about the prognosis and achieving optimal out come by performing rational procedure. It may be expected that presence of preexisting posterior capsular defect may be dangerous during the process of aspiration by enlarging the defect. But we observed it is not so for the defects with thick fibrosed margins.

In the present study male preponderance is not surprising as trauma, as such, is more prevalent in male population.[19-21]

Cataract extraction with posterior chamber implantation is a well established surgical procedure for both uniocular and binocular cataract worldwide. This is well accepted because of its maximum closeness to the position of the human crystalline lens, less chance of developing uveitis, secondary glaucoma and resultant cystoid macular oedema. In the current series, despite pre existing posterior capsular rupture in 38 eyes we were able to perform posterior chamber IOL (PC IOL) in 15 (40%) eyes. This was primarily due to fibrosed margins of the capsular rupture in 14 (93%) eyes and small circular rupture in one (7%) eye. Though it was possible to insert posterior chamber lens in the eyes with preexisting posterior capsular defects, it is advocated that the

ophthalmic surgeons must have both PC and AC IOL in their hands in the operation theatre and the option of insertion will be judged only on the table during actual surgical procedure.

The most common early postoperative complication in the current series was severe fibrinous uveitis in 14 (12.5%) eyes. It was equally common whether the IOL was in capsular bag, sulcus, anterior chamber or no IOL. We feel, uveitis could be due to more of surgical trauma in a previously traumatized eyes rather than the reaction to the IOL materials, as all the 14 eyes showed reaction on the first post operative day. Although the inflammation was a cause of concern during the early postoperative period all but one responded to medical therapy. However, as the reaction caused pigment dispersal from iris in 6 (5%) eyes subsequent IOL deposits were observed in these eyes. Surprisingly four out of these six eyes had good visual acuity despite pigment deposit.

Posterior capsular opacification following traumatic cataract surgery is often a common problem in traumatic cataractous eyes. To prevent opacification Eckstein et al in 1998 advocated early YAG Laser posterior capsulotomy.[23] As our centre did not have access to the YAG laser during the study period, we routinely performed primary posterior capsulotomy during surgery. The less incidence of posterior capsular opacification in the current series could be attributed to the same. However, as we do not have long follow up in our patients we could not comment precisely on this aspect.

Risk factors for poor visual outcome and modified surgical procedures to obtain optimal vision have been elaborated by various authors.[22,24] The visual achievements after suture removal in these eyes were encouraging attributing to 61 (54.5%) had BCVA ³'3d 6/18 and another 35(31%) had between 6/60 – 6/2. This could be due to the fact that ultrasonically appreciable posterior segmental pathology was not included in the series. Though the present series has certain limitations such as short term follow up, no use of modern phacoemulsification and aspiration technique due to non availability of the equipment during study period. However, despite all the constraints our study revealed that a large number of patients may be benefited even by simple conventional method of surgery if rational approach in traumatic cataracts following penetrating injury is followed.

CONCLUSION

Corneal opacity with associated cataract following traumatic injury is common and ironically occurrence is more prevalent in younger population. Rational surgical approach in traumatic cataract surgery provides encouraging result. To comment on actual outcome long term follow up is mandatory.

REFERENCES

1. Hiles DA, Wallar PH, Biglan AW. Amblyopia in pediatric cataract. Journal Paed Ophthalmol 1977; 13L319-23.
2. Wos M, Mirkiewicz-Sieradzka B. Traumatic cataract—treatment results. Klin oczna 2004; 106L 31-4.
3. Synder A, Kobielska D, Omulecki W. Intraocular lens implantation in traumatic cataract] Klin Oczna 1999; 101:343-6.
4. Pavlovic S. Epilenticular intraocular lens implantation in traumatic cataract with a ruptured posterior capsule. Am J Ophthalmol 2000; 130L352-3.
5. Parihar JK, Dash RG, Vats DP, Verma SC, Sahoo PK, Rodrigues FE. Management of anterior segment penetrating injuries with traumatic cataract by Pentagon approach in paediatric age group: constrants and outcome. India J Ophthalmol 2000; 48:227 -30.
6. Brar GS, Ram J, Pandav SS, Reddy GS, Singh U, Gupta A. Postoperative complications and visual results in uniocular pediatric treaumatic cataract. Ophthalmic Surg Lasers 2001 May-Jun;32(3):233-8.
7. Gradin D, Yorston D. Intraocular lens implantation for traumatic cataract in children in East Africa. J Cataract Refract Surg 2001; 27:2017-25.
8. Vangelova A. Implantation microsurgery in traumatic cataract. Khirurgiia (Sofiia) 2001;57(5-6):38-40.
9. Xiang Q, Liu S, Xu X, Tan Q, Wu X, Ma W. Simultaneously corneal laceration repair, traumatic cataract removal and intraocular lens implantation. Yan Ke Xue Bao. 2000; 16:249-51.
10. Jacobi PC, Dietlein TS, Lueke C, Jacobi FK. Multifocal intraocular lens implantation in patients with traumatic cataract. Ophthalmology 2003;110:531-8.
11. Weinand F, Plag M, Pavlovic S. Primary implantation of posterior chamber lenses after traumatic cataract penetration. Ophthalmologe 2003 oct;100(10):843-6.
12. Kamlesh, Dadeya S. Management of paediatric traumatic cataract by epilenticular intraocular lens implantation: long-term visual results and postoperative complications. Eye 2004; 18:126-30.

13. Lacmanovic Loncar V, Petric I. Surgical treatment, clinical outcomes, and complications of traumatic cataract: retrospective study. Croat Med J 2004;45:310-3.

14. Newsom TH, Oetting TA. Indocyanine green staining in traumatic cataract. J Cataract Refract Surg 2000; 26:1691-3.

15. Zheng G, Chen Y, Wang L, Chen G, Zhang X. The choice of methods of intraocular lens implantation in traumatic cataract in the absence of capsular and zonular support. Zhonghua Yan Ke Za Zhi 1998; 34:327-9.

16. Mavrikakis I, Casey JM. Phacoemulsification and endocapsular implantation of an artificial iris intraocular lens in traumatic cataract and aniridia. J Cataract Refract Surg 2002;28:1088-91.

17. Bhatia IM, Panda A, Sood NN. Management of traumatic cataract. Ind J Ophthalmol 1982;31:290 – 3.

18. Panda A, Bhatia IM, Dayal Y. Ocular injury – a socioeconomic importance. Afro Asian Ophthalmol 1985;3:172-4.

19. Caroline JM. Sport associated eye injury. Br J Ophthalmol 1987;71:701-5.

20. Fong LP, Eye injuries in Victoria Australia. Med J Aust 1995; 162:64-8.

21. Umeh RE, Umeh OC. Causes and visual outcome of childhood eye injuries in Nigeria. Eye, Royal College of Ophthalmologists. 1997;11:489-95

22. Churchill AJ, Noble BA, Etchells DE et al. Factors effecting visual outcome in children following aniocular traumatic cataract Eye 1995;9:285-91

23. Eckstein M, Vijaylakshmi P, Killedar M, Gilbert C, Foster A. Use of IOL in children with traumatic cataract. Br J Ophthalmol 1998;82:911-5

24. Ainsworth JR, Cohen S, Levin AV et al. Paediatric cataract management with variation in surgical technique and aphakic optical correction. Ophthalmology 1997;104:1096-101

25. Panda A, Sankar Kumar t. Cataract extraction & keratolasty. Ind J Ophthalmol 1991; 39:102-4.

26. Zhang Y, Zhang J, Shi S. Determination of posterior lens capsule status in traumatic cataract with B-ultrasonography. Zhonghua Yan Ke Za Zhi 1998;34:298-9.

27. Shi B, Chen W. Clinical significance of preoperative B-ultrasonography for traumatic cataract. Zhonghua Yan Ke Za Zhi 1999;35:371-2.