Importance of Early Intervention of Traumatic Cataract in Children

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Abstract:-

➤ Aim:

To evaluate the intraoperative complications & postoperative outcome of early intervention of traumatic cataract in children due to open globe injuries.

> Materials and Methods:

40 cases of unilateral cataract having repair of open globe injuries previously were included in this prospective study. Primary repair of corneal injuries were done with 10-0 Nylon under general anesthesia. Secondary intervention with IOL implantation were done within 4 weeks of primary repair. Age range was 4-14 years and minimum follow up 3 months. Intraoperative and postoperative complications and final best-corrected visual outcome were recorded.

> Results:

All cases had pre-existing anterior capsular tear and flocculent lens matter in anterior chamber. IOL were implanted in the bag in 90% cases. Intra-operatively 4 cases revealed pre-existing posterior capsular hole and IOL were implanted in the sulcus. Synechiolysis was done in 3 cases. There was no iatrogenic PC rent. Postoperatively no cases showed synechiae formation, pupil capture and IOL displacement. Visual acuity was 6/9 to 6/60 in all cases and intraocular pressures were digitally normal. No optic atrophy and RD were noticed at last follow up. Most common causes of decreased vision were corneal scar and astigmatism.

> Conclusion:

Early cataract surgery with IOL implantation after repair of open globe injuries carries favorable intraoperative and postoperative outcome.

Keywords:- Early Intervention, Traumatic Cataract in Bag Implantation, Sulcus Implantation.

I. INTRODUCTION

Traumatic cataract is one of the important causes of blindness following ocular trauma either open or closed globe and is preventable ^[14]. Awareness of the causes and consequences of pediatric eye trauma plays a vital role in health education and prevention of blindness^[4]. Pediatric eve is in development, and trauma will lead to more severe complications. Without effective and prompt treatment, pediatric cataract will deteriorate vision, including loss of binocular vision, amblyopia, strabismus, low vision in life and even blind ^[1,17]. Ocular injuries are divided into two main groups: closed globe injuries and open globe injuries. An open globe injury is a severe form of trauma leading to a fullthickness defect in the cornea, sclera, or both, exposing the intraocular compartments to the external environment. Open globe injuries are classified into four groups: penetrating injury, perforating injury, rupture and intraocular foreign body. The lack of treatment in childhood trauma may lead to various complications such as cataract, retinal detachment, vitreous hemorrhage, corneal opacity, amblyopia, IOFB and toxicity due to chronic foreign bodies, endophthalmitis, and sympathetic ophthalmitis ^[2,10]. Traumatic cataracts account for 29–57% of childhood cataracts ^[3,5,17]. Management for pediatric traumatic cataract varies depending on the associated ocular injuries and the patients' age. To achieve better visual outcomes optimal timing and surgical intervention is needed. Timing of cataract surgery and intraocular lens implantation in trauma continues to be debated worldwide. Current data suggest that improved visual outcome results from intervention at 2-30 days ^[14,15,26]. Early intervention of traumatic cataract surgery will avoid synechiae formation, intra-operative hemorrhage & pupil constriction and post-operatively reduce inflammation though there was controversy on the timing of cataract extraction and IOL implantation. In case of early intervention intra-operative in bag IOL implantation will be possible. IOL in sulcus placement may cause a series of complications.

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II. MATERIALS AND METHODS

This prospective study was conducted at Chittagong Eye Infirmary and Training Complex from May 2023 to January 2024. All the cases operated for traumatic cataract surgery within 44 days of repair of open globe injuries were included in this study. The age range of the study population was 4-14 years. Visual acuity was taken by Snellen's chart. Slit lamp bio- microscopy was done to see the location of corneal scar, sphincter rupture, iridodialysis & lens morphology. Anterior capsular tear, zonular weakness, lens subluxation were recorded. B scan were done to exclude the vitreous opacities and retinal detachment. All the patients were planned for cataract surgeries with IOL implantation. Biometry were done using SRK-T formula & under correction of the IOL power were done using Dahan's formula. All the cases were operated under general anesthesia. Investigations for general anesthesia such as complete blood count (CBC) and X-ray chest P/A view were done and pre-anesthetic check up by an anesthetist was ensured. Intubation was done with laryngeal mask airway (LMA) and sevoflurane used as inhalation agent during anaesthesia.

Surgical Technique: Preoperatively pupils were dilated with 10% phenylephrine and 1% tropicamide eye drops. The ocular adnexa and the surrounding skin were cleaned with 5% povidone iodine. The eye was draped with sterile draping cloths. Corneal tunnels were made at 10'0 and 2'0 clock position by MVR blade. Trypan blue was given to stain the anterior capsule. Continuous curvilinear capsulorrhexis was done if possible. Pre-existing anterior capsular tear was modified to capsulotomy. Automated irrigation and aspiration of lens were done with the handpiece of Optikon (R-Evo Smart) machine. Soft foldable intraocular lens (Alcon, MBI) was implanted in the bag. Three piece intraocular lens were implanted in sulcus. Primary posterior capsulotomy and anterior vitrectomy were done in the cases below 7 years of age. Synechiolysis were done if needed. All the cases were sutured with 10-0 nylon. All patients received subconjunctival injections of Dexamethasone (2 mg) and gentamicin (5 mg). Eye was kept paded for 1 day. First dressing was done on 1st post-operative day. Topical steroid and antibiotic with systemic antibiotic and steroid were given during discharge.

Follow up were given at 1 week, 4 weeks and 12 weeks after surgery. Refraction was done at 4 weeks follow up and suture were removed after 6 weeks. The minimum follow-up was 3 months. SPSS version 16 was used for statistical analysis. A p-value of <0.05 was used as statistically significant.

III. RESULTS

40 eyes of 40 patients were included in this study. The mean age of the cases was 7.30 ± 3.42 and age range 4-14 years. 28 of the cases (70%) were male and 12 of the cases (30%) were female. All the cases were traumatic cataract due to open globe injuries by various traumatic agents (table 01). Interval between globe repair and cataract extraction and IOL

implantation varies from 4 to 44 days according to the status of crystalline lens (table 02).

Agent	Frequency	Percent
Stick	10	25
Pen	6	15
Plastic toy	6	15
Flying stone	4	10
Finger	2	5
Umbrella	2	5
Battery	2	5
Wire	2	5
Needle	2	5
Bird	2	5
Rubber band	2	5
Total	40	100

Table 2: Interval Between Injury Repair and Cataract Extraction

Cutaract Endaction			
Days	Frequency	Percent	
4-13	8	20	
14-23	4	10	
24-33	12	30	
34-44	16	40	
Total	40	100	

All cases had pre-existing anterior capsular tear and flocculent lens matter in anterior chamber. Soft foldable IOL were implanted in the bag in 90% cases and three-piece IOL were placed in sulcus in the remaining 10% cases (fig. 01). Intraoperatively 4 cases revealed pre-existing posterior capsular hole and IOL were implanted in the sulcus. Synechiolysis was done in 3 cases. There was no iatrogenic PC-rent.



Fig 1: Site of IOL Implantation

Postoperatively no cases showed synechiae formation, pupil capture and IOL displacement. Preoperatively all patients have had visual acuity $\leq 6/60$ but 3 months postoperatively 80% (n-32) patients achieved >6/18 vision (table 03 and 04).

VA	Frequency	Percent
PL	2	5
HM	10	25
CF	14	35
6/60	14	35
Total	40	100

Table 3: Pre-Operative Vision

Table 4: Final Best Corrected	Visual Outcome at 3 Months
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VA	Frequency	Percent
6/36	4	10
6/24	4	10
6/18	8	20
6/12	12	30
6/9	12	30
Total	40	100

Intraocular pressure was digitally normal in all cases. No post-operative infection or endophthalmitis were recorded. No optic atrophy and retinal detachment were noticed at last follow up. Most common cause of decreased vision was corneal scar and astigmatism. 95% patients showed different types of astigmatism (table 05).

Table 5: Refractive Status of the Patients at 3 Months Follow

ep			
Refractive Status	Frequency	Percent	
Simple hyperopia	2	5	
Simple hyperipic	14	35	
astigmatism			
Simple myopic astigmatism	6	15	
Compound hyperipic	14	35	
astigmatism			
Compound myopic	2	5	
astigmatism			
Mixed astigmatism	2	5	
Total	40	100	

IV. DISCUSSION

A vast majority of ocular injuries are associated with traumatic cataract ^[16]. Traumatic cataract patients were mostly in the age group of 4-12 years with an age range of 3 - 17 years [11,23]. The morphology of traumatic cataracts can vary to include total cataract, membranous, rosette, and capsule rupture accompanied by lens cortex material in the anterior chamber of the eye ^[11,21]. Traumatic cataract surgery is performed either as an early procedure in association with the repair of laceration in open globe injury, at early days after presentation of penetrating injury, or as a late procedure in a quiet eye. If the lens capsule is ruptured and lens materials have been introduced into the anterior chamber it is preferable that lensectomy be performed as an early procedure to prevent inflammation, lens particle induced uveitis and glaucoma. Because of corneal irregularity, associated with open globe injury the power of intraocular lens (IOL) is calculated mostly by the biometry of the fellow eye ^[16]. Even with prompt first aid and surgical treatment, many children with traumatic cataract end up with permanent visual disabilities such as amblyopia or even blindness because of

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the severity of the injury ^{[4].} Controversy exists over the timing of cataract extraction and IOL implantation. Arguments can support both primary and secondary cataract extraction. Primary cataract extraction with wound repair may have distinct advantages, such as controlling inflammation and intraocular pressure. In pediatric patients the removal of media opacity may be crucial to prevent vision deprivation amblyopia [14]. In case of closed globe injury, immediate intervention will not be needed except traumatic hyphaema. Closed monitoring of IOP is needed. Vision may decrease due to Optic atrophy, retinal detachment and cataract. Open globe injuries should be repaired as early as possible to prevent endophthalmitis and to save eyeball. Open globe injuries with cataract should be early intervened. These may be associated with anterior capsular tear, flocculent lens matter & posterior capsular tear. Through anterior capsular tear, lens matter may leak into anterior chamber cause rises of IOP and excessive inflammation. Capsular bag will be collapsed. It may be also associated with posterior capsular tear. Through this tear lens matter may leak into vitreous cavity. Vitreous opacity may develop and bag will be collapsed. Tractional retinal detachment may occur. Delaying of the surgery cause leakage of the cortical matter from the bag. This result in collapse of the bag and subsequently fibrosis develop. So in bag IOL placement may not be possible. IOL are to be placed in the sulcus which may cause series of complications. Flocculent cortical matter may cause excessive inflammation, increase of IOP and decrease corneal clarity. Due to loss of corneal clarity, subsequent intervention and IOL implantation will be troublesome. Delaying in surgery cause rigid synechiae formation. Releasing of these synechiae may cause intraocular hemorrhage and pupil constriction. So intra-operative in bag IOL implantation may be difficult. Unwanted intraocular hemorrhage may cause vitreous opacity due to pre-existing posterior capsular tear. Cataract associated repaired open globe injuries are sometimes associated with sectoral iridectomy. So in these cases during capsulotomy anterior capsule at the side of absent iris should be preserved to prevent protrusion of the IOL in the anterior chamber. Long standing traumatic cataract whether open or closed globe may be associated with thick fibrosed posterior capsule. So performing primary posterior capsulotomy is difficult & vitrectomy may become troublesome. Vision may not improve after successful early cataract surgery having previous repaired open globe injuries. This is because of corneal scar and astigmatism. Small number of samples, measurement of Intraocular Pressure digitally and short follow up were the limitation of our study.

V. CONCLUSION

Early cataract surgery with IOL implantation after repair of open globe injuries carries favorable intraoperative and postoperative outcome.

- Conflict of Interest: None.
- Financial Support: None

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