

Outcome of Refractive IOL Exchange in Traumatic Unilateral Axial Myopia

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Introduction

Ocular trauma occurring in childhood, adolescence or young adulthood causes unilateral increase in Axial Length (AL). Besides this, paediatric cataract surgery especially for traumatic cataract, in contrast to developmental cataract causes accelerated increase in AL [1]. Altered scleral rigidity following trauma and ocular surgery could be a possible cause for this. Periodical reviews targeting emmetropia at every stage should be emphasized to prevent amblyopia to set in. We report two pseudophakic cases with differing sequence of events managed optimally with Intra Ocular Lens (IOL) exchange after stabilization of their refractive status.

Case 1

An 8 years old child presented in 2003 with the complaint of defective vision in right eye (RE) following a penetrating ocular injury

two weeks back. He had undergone RE corneal tear repair under general anaesthesia elsewhere. Anterior segment examination of the RE showed sutured corneal tear, irregular pupil with multiple posterior synechiae and total traumatic cataractous lens with anterior lens capsule tear. Extra ocular movements were normal in RE. B-scan of RE was normal with no evidence of retinochoroidal detachment or any intraocular foreign body. He underwent uneventful small incision cataract surgery with implantation of three pieces rigid Polymethylmethacrylate (PMMA) IOL+22.0D (B3602 Aurolab).

The visual acuity, Intra Ocular Pressure (IOP), AL and keratometry values for preoperative & follow visits are tabulated (Table 1). At 6 months; RE vision dropped to 6/36 due to thick posterior capsular opacification. Post ND-YAG laser, his vision improved to 6/9 and was under regular review with stable refraction till 2008. On subsequent follow-up visits, there was a gradual deterioration of vision and increase in AL (Table 1).

Visit	Eye	Refraction			IOP (mm Hg)	AL (mm)	Keratometry
		UCVA	BCVA	Refractive error			
Preoperative	RE	PL+	PL+	NA	RE=12 LE=14	RE=23.20 LE=23.00	RE : Irregular mires due to sutured corneal tear LE : K1=42.50D @180° K2=43.50D @ 90°
1& 3 months	RE	6/12	6/9	Cylinder=- 0.75D @15°	RE=17 LE=15	NR	NR
2004 (6 months post ND YAG Laser)	RE	6/12P	6/9	Cylinder=- 0.75D @15°	RE=18 LE=15	NR	NR
2006	RE	6/12	6/9	Cylinder=- 0.75D @15°	RE=18 LE=14	RE=23.22 LE=23.18	RE : K1=42.50D @150° K2=42.00D @ 60° LE : K1=42.25D @ 180° K2=42.75D @ 90°
2007 - 2008	No change in refraction & AL						
2009	RE	6/24	6/12	Sphere=- 0.75 D Cylinder=- 0.5 @180°	RE=10 LE=12	NR	NR
2010	RE	6/60	6/12	Sphere=- 1.5 D Cylinder=- 0.5D @ 180°	RE=19 LE=16	NR	NR
2011	RE	5/60	6/9	Sphere=- 5.50 D Cylinder=-1D @ 30°	RE=14 LE=14	RE=25.82 LE=23.20	RE : K1=42.83D @ 163° K2= 43.16D @ 73° LE : K1=42.08D @ 5°

							K2=43.05D @ 95°
2012*	RE	5/60	6/9	Sphere=- 9.00 Cylinder=- 0.75D @ 30°	RE=28 LE=14	RE=26.29 LE=23.20	RE : K1=42.83D @ 163° K2=43.16D @ 73° LE : K1= 42.08D @ 5° K2=43.05D @ 95°
2013*	RE	5/60	6/9	Sphere=- 9.00D Cylinder=- 1D @ 30°	RE=14 LE=16	RE=26.29 LE=23.20	RE : K1=42.83D @ 163° K2=43.16D @ 73° LE : K1=42.08D @ 5° K2=43.05D @ 95°
2013 (1 month post IOL exchange)	RE	6/18	6/9	Cylinder=-1.0D @180°	RE=18 LE=12	NR	NR

UCVA: Uncorrected visual acuity; BCVA: Best corrected visual acuity; PL: Perception of light; IOP: Intra ocular pressure; AL: Axial length; NA: Not applicable; NR: Not recorded; RE: Right eye; LE: Left eye; IOL: Intra ocular lens; ND YAG: Neodymium Yttrium -Aluminum-Garnet.

*The IOP, refractive status was stable for 1 year ; AL and keratometry readings in 2012&2013 were same

Table 1: Case 1-Preoperative and postoperative details.

Antiglaucoma medication was started in 2012 due to raised IOP (28 mmHg, gonioscopy-360° peripheral anterior synechiae). Fundus examination revealed a pink disc with cup disc ratio of 0.45 and myopic crescent. Foveal reflex was normal with no break/degeneration in periphery (Figure 2a). Optical coherence tomography showed normal macula with reduced choroidal thickness (Figure 2b). An IOL exchange (three piece rigid PMMA IOL + 13.5D ;B3602 Aurolab) was done (Figure 1a and b) for severe refractive error and intolerance to spectacles and contact lens. At 1year follow-up his refraction and IOP was stable.

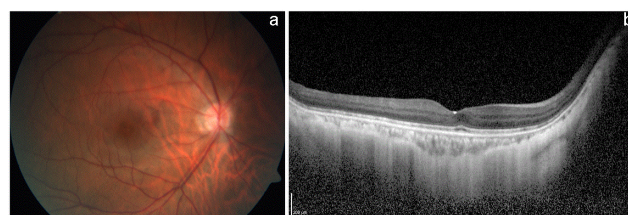


Figure 2: (a) Case 1: Fundus image; (b) OCT picture.

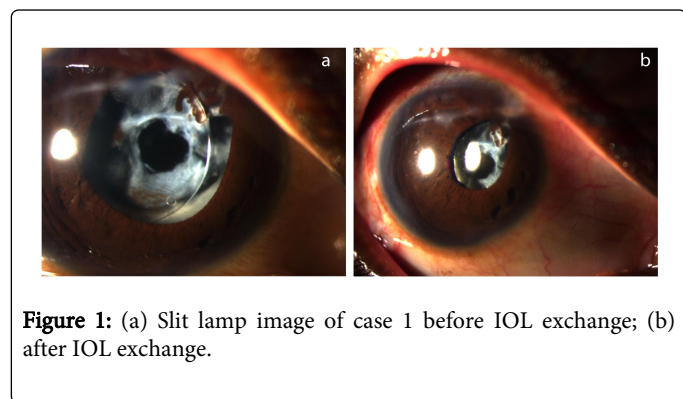


Figure 1: (a) Slit lamp image of case 1 before IOL exchange; (b) after IOL exchange.

Case 2

23 years male had history of blunt trauma at the age of 6 years and denied for cataract surgery. He underwent cataract surgery at 14 years elsewhere with reasonably good visual gain. Patient history revealed stable refraction for a few years, after which it gradually deteriorated. He presented to us in 2013 with the complaint of progressively decreasing vision in RE. (Table 2) He underwent IOL exchange with implantation of three pieces rigid PMMA IOL+16.5D (B3602 Aurolab) under guarded visual prognosis due to possible pre-existing amblyopia. Follow-up at 6 months showed a stable refraction.

Visit	Eye	Refraction			A-Scan	Slit lamp examination
		UCVA	BCVA	Refractive error		
Old medical records (At 6 years)	RE	6/12P	6/9P	Not known	RE=22.50 mm LE=22.75 mm	Not available
Old medical records (At 14 years)	RE	6/18P	6/18P	Not known	RE=23.10 mm LE=22.74 mm	
2013	RE	4/60	6/18	Sphere=- 5.50D Cylinder=- 1.5D @ 10°	RE=25.11 mm LE=22.62 mm	Anterior segment :

					RE:K1=42.5 D @ 140° K2=43.75D @ 50°	Linear scar in cornea, irregular pupil with traumatic mydriasis and a PCIOL in sulcus.
1month (Post IOL exchange)	RE	6/24	6/18	Cylinder =- 1.25 D @ 10°	NR	Ocular movement : Normal RE=Corneal reflex exotropia >10° Gonioscopy : RE - Angle recession IOP : RE=16 & LE=18 Posterior segment : Normal
UCVA: Uncorrected visual acuity; BCVA: Best corrected visual acuity; IOP: Intra ocular pressure; PCIOL: Posterior chamber Intra ocular lens; RE: Right eye; LE: Left eye; IOL: Intra ocular lens; NR: Not recorded						

Table 2: Case 2–Preoperative and postoperative details.

Discussion

Ocular traumatic insult, whether penetrating or blunt, with or without prolonged visual deprivation causes ipsilateral unilateral elongation of the eyeball [1].

This abnormal unilateral increase in AL is attributable to multiple factors including altered scleral rigidity with errors in ultramicroscopic arrangement and growth of scleral fibres, increase in IOP and ocular surgeries [2,3]. According to a theory, reduction in quality of retinal image also plays a role in this abnormal increase in AL, as growth of the eyeball depends on certain growth factors and the generation of these growth factors depends upon good quality retinal image [3].

Earlier the age at which trauma occurs more pronounced is the increase in AL.4 Additionally, penetrating trauma causes more pronounced increase in AL as compared to blunt trauma. Similarly, more the time interval between trauma and surgery for a visually significant cataract, more the chance of abnormal increase in AL [4]. In both cases there was a significant increase in AL over a period.

Stimulus deprivation amblyopia is also a concern in such cases of ocular trauma due to a corneal scar and/or cataract [5]. Under correction in these cases led to residual hyperopia to counter the myopic shift which is highly amblyogenic. Additionally, non-compliance with spectacles and the unstable refraction due to myopic shift in the post-operative period aggravates the amblyopia. Frequent reviews and timely, prompt intervention is a must to ensure optimal visual outcome.

Keratorefractive surgeries and IOL exchange are options for such patients after their refractive status stabilizes to treat the residual

refractive error. Between these two options, IOL exchange scores above keratorefractive [(Laser-Assisted in situ Keratomileusis (LASIK), Photorefractive keratectomy (PRK)] surgeries as majority of these traumatic cases are associated with corneal scar due to trauma and/or corneal tear suturing. In the first case, regular follow up and timely intervention produced good visual outcome after IOL exchange. The delayed presentation of second case led to amblyopia, resulting in limited visual recovery.

In conclusion our case report showed a significant increase in AL following trauma and highlights the importance of preventing amblyopia in traumatic cataract cases by aiming for emmetropia at every stage. The residual refractive error can be managed reasonably well with IOL exchange, even years after the primary surgery.

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