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Visual Outcomes of Secondary Lens Implants in Children with Different Etiologies

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Abstract

This study investigated visual outcomes and factors that impact vision in children receiving secondary intraocular lens (IOL) implants.

Keywords: Optic disc drusen (ODD), Ophthalmology, EDI-OCT, OCT RNFL

Intruduction

The estimated prevalence of congenital cataract (CC) ranges from 2.2 to 13.6 per 10,000 individuals globally [1]. Variations in prevalence among populations are likely attributable to the difference in factors among countries including screening programs, immunization rates, nutritional status, and population genetics [1,2]. Moreover, the necessity for treatment varies according to density of opacities at birth, partial cataracts at birth, and cataract progression during childhood. Optimal outcomes can be obtained through early identification and diagnosis and appropriate clinical care. Typically, a team of health-care professionals should manage children with cataracts. Moreover, well-established referral pipelines and clinical networks are crucial to achieve favorable outcomes. Although patient management, ranging from diagnosis to surgery, has substantially altered recently, variations are still noted among different countries.

Acquired monocular blindness is mainly caused by ocular trauma. Open-globe injury caused by intraocular foreign bodies, posttraumatic endophthalmitis, penetrating injuries, or ocular rupture results in poor vision outcomes (2-8). Posttraumatic endophthalmitis is a rare and severe complication of open-globe injury with a poor prognosis.

In infants, intraocular lens (IOL) implantation can be beneficial in terms of visual rehabilitation and reduce postoperative complications. However, the timing of implanting lens in children with congenital cataract must be carefully decided by considering age during surgery, postoperative complication risks, and treatment affordability of patients' families along with the selection of suitable IOL power and type. IOL can be safely and effectively implanted in infants aged ≥6 who have well-developed eyeballs and satisfactory systemic conditions. Otherwise, surgeons can opt for secondary lens implants.

Congenital cataract, which is characterized by vision loss and amblyopia formation, is a treatable cause of loss of vision in childhood [1]. Visual rehabilitation can be successful when performed when children are aged <3 months, which is considered the amblyogenic window [2]. The axial length rapidly increases until 2 to 3 years of age in healthy children [2]. Moreover, lens implantation after cataract removal can cause myopic shift in patients aged <2 years. Furthermore, these children can develop cosniderable

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uveal inflammation [9,10] and intensive posterior capsule opacification. Because the safety and efficacy of IOL implantation remain controversial, primary cataract removal is preferred in cases detected early. Subsequently, contact lenses or spectacles can be employed for aphakia correction combined with amblyopia management [11,12]. In the Infant Aphakia Treatment Study, no differences in visual acuities were noted between children who had unilateral cataract and received primary lens implants and those using contact lenses for surgical aphakia correction [10]. Secondary lens implantation is opted when aphakic children aged >2 years cannot tolerate wearing contact lenses or spectacles [13]. Limited studies have examined secondary IOL implantation's long-term vision outcomes. This study investigated secondary IOL implantation's long-term vision-related outcomes in children with aphakia aged >2 years and potential factors impacting visual acuity postoperatively.

Secondary lens implantation result in satisfactory outcomes in vitrectomized eyes. After vitrectomy, spectacles can be employed for correcting vision. However, the technique and timing of secondary lens implantation to correct vitrectomized aphakia remain unclear, particularly for the loss of capsule integrity and zonular dialysis. Primary lens implantation performed during initial reconstruction resulted in satisfactory outcomes in injured eyes [8-11]. However, primary lens implantation can lead to complications including synechiae, fibrinous uveitis, retinal detachment, pupillary capture, and those related to the posterior segment [14-17].

Table 1: Comparative study of visual outcome amongst traumatic and non-traumatic aetiology

Vision categories	Aetiology		Total
	Nontraumatic	Traumatic	
<1/60	4	8	12
1/60-3/60	11	11	22
6/60-6/36	3	5	8
6/24-6/18	26	3	29
6/12-6/9	7	4	11
6/6-6/5	1	1	2
Total	52	32	84

Methods

We retrospectively evaluated the medical details of children receiving secondary lens implants between 2000 and 2019. The ethical committee approved this study. To ensure the identification of eligible children, a chronological surgery list was cross-referenced by performing a database search of children receiving treatment for traumatic or nontraumatic cataract. Children who were aged between 0 and 18 years during their secondary lens implantation, which was performed by a single surgeon, were examined. Children with congenital glaucoma or retinopathy of prematurity were excluded. In addition, those with incomplete data regarding cataract removal or postimplantation follow-up were excluded. Intra- and post-operative complications and visual outcomes at the final visit were evaluated.

Information regarding sex, age during surgery, ethnicity, cataract type, laterality, corneal diameter, keratometry, axial length determined through immersion A-scanning, age during IOL implantation, IOL power and type implanted, reason for IOL implantation, and site of IOL fixation was collected. All data were exported in the online pretest format and added in an Excel sheet; all data were examined using SPSS 22. Descriptive analysis, cross tabulation, and t test were performed for statistical analyses. A P value of <0.05 was considered to be statistically significant.

Results / Case report

Our cohort consisted of 84 eyes (mean age: 7.88 ± 6.07 years). Of the 84 eyes, 24 (28.6%) and 60 (71.4%) were female and male patients, respectively, and 32 (38.1%) had

Table 2: Comparative study of reasons for no improvement of vision amongst traumatic and non-traumatic aetiology

Cause	Non Traumatic		Traumatic		Total	
	No	%	No	%	No	%
Corneal opacity	4	7.69	10	31.25	14	14.29
Lens malposition	1	1.92	2	6.25	3	3.57
Inflammation	1	1.92	3	9.37	4	4.76
Ps problems	1	1.92	6	18.75	7	8.33
Secondary glaucoma	1	1.92	3	9.37	4	4.76
Amblyopia	4	7.69	0	0	4	4.76
Pseudophakic bullous keratopathy	1	1.92	2	6.25	3	3.57
Normal	36	69.23	9	28.12	45	53.57
Lost follow up	1	1.92	1	3.12	2	2.38
					84	100

Table 3: Comparative study of visual outcome according to Lens location

	IOL Placement				Total
	ACIOL	BAG	IN SULCUS	SFIOL	
<1/60	0	0	8	4	12
1/60-3/60	1	1	11	9	22
6/60-6/36	0	1	4	3	8
6/24-6/18	0	11	14	4	29
6/12-6/9	0	0	7	4	11
6/6-6/5	0	0	1	1	2
Total	1	13	45	25	84

P=0.09

Table 4: Comparative study of visual outcome according to Lens material

Vision Categories	IOLMATERIAL		Total
	Acrylic	PMMA	
<1/60	0	12	12
1/60-3/60	3	19	22
6/60-6/36	0	8	8
6/24-6/18	11	18	29
6/12-6/9	0	11	11
6/6-6/5	0	2	2
Total	14	70	84

traumatic cataract. We observed significant improvements in vision following lens implantation (p=0.000). Those with nontraumatic cataracts exhibited better outcomes that did the traumatic cataract group (p = 0.004). Corneal opacity caused comorbidities in the traumatic group (14/52,14.29%). Visual outcomes significantly improved in young patients and were not affected by other variables.

Discussion

Aphakia is caused due to many factors in children. This study examined factors such as congenital cataract, open-globe ocular trauma, and congenital anomalies such as ectopia lentis unlike other studies that focused on congenital cataracts, traumatic cataracts, or ectopia lentis [3-8]. Here, we compared visual outcomes for all categories. The nontraumatic category exhibited more favorable outcomes possibly due to comorbidities in traumatic cases (p=0.004; Table).

Secondary lens were implanted in different locations, namely the bag and sulcus; scleral-fixated and posterior chamber iris claw lens were implanted. No significant differences were observed (p=0.09). According to Wood et al., secondary lens implanted in the capsular bag resulted in fewer complications than did those in the ciliary sulcus. Many patients recruited to this study received implants in the capsular bag (69.4%). This finding may be responsible for low complication rates and indicates that capsular bag preservation is crucial for secondary lens implantation. However, this finding limits the generalizability of study results to other centers where a higher proportion received implants in the bag and sulcus [18].

The major complication or cause of nonimprovement of vision in this study was corneal opacity (12/84 patients, 14.29%, Table). A study reported VAO, secondary glaucoma, and refractive problem as causes in 5.4%, 16.4%, and 8.1% of patients, respectively. The current study included many (32/84) posttrauma cases causing corneal opacities (Table) [18].

The mean ages during secondary lens implantation were 94.56 ± 72.84, 55.2 ± 21.6, and 46.64 ± 29.37 months in our study, Wood et al.'s study, and Rong et al.'s study, respectively [18, 19]. This might be attributed to the lack of awareness in rural areas and ignorant parents. Owing to the low socioeconomic status, compliance of aphakic spectacles and contact lenses is poor, thus affecting the outcome because of amblyopia. The mean follow-up period was 3.53 ± 5.6 years in this study, 57.6 ± 33.6 months in Woods et al.'s study, and 109.09 ± 18.89 months in Rong et al.'s study, respectively. This difference can be due to variations in socio demographic factors. Furthermore, 42 (50%) and 12 (14.3%) of 84 (50%) patients achieved visual acuities of >6/24 and <1/60, respectively.

The median visual acuities reported by Woods et al. and Rong et al. at the final visit were 20/40 and 6/18, respectively. These results are similar to those reported by previous studies [16, 17] including that conducted by Nihalani and Vanderveen [14] who demonstrated that 50% eyes had a BCVA of ≥20/40 and Shenoy et al. who found that 35% eyes had a BCVA of ≥20/40 [20]. Hu et al. demonstrated that secondary iris claw lens implantation resulted in satisfactory vision [21]. Forlini indicated that retro pupillary iris claw lens is a suitable option for scleral-fixated or angle-supported lens [22]. Retropupillary iris claw lens implantation can safely and effectively correct aphakia without capsule support [23, 24].

He et al indicated that secondary lens implants can safely correct aphakia in for open-globe injury patients undergoing vitrectomy. This finding is in agreement with that of this study; we noted no differences in outcomes among various lens positions [25]. Secondary sulcus IOL could be implanted after preserving the anterior lens capsule during primary implantation in children with anterior PFV; this procedure resulted in favorable vision outcomes after operation and a compatible proportion of complications [26-28].

Yu and Maxwell observed favorable longer-term findings and few complications after sutured scleral-fixated foldable

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lens implantation. Their procedure is safe, does not need complex equipment, and can correct aphakia in the absence of adequate capsule support [29, 30]. Edelstein S reported successful outcomes of scleral-fixated lens implants in congenital ectopia lentis, which is similar to this study [31]. This study compared the outcomes of various lens positions in different etiologies and exhibited no significant differences.

Strength of the present study is that the same surgeon operated all eyes. The study is limited by its retrospective nature; however, incomplete records were excluded. Future studies should include more patients and examine different postoperative complications. In addition, because young patients were enrolled, we could not perform BCVA Snellen measurements. A more standardized method for measuring visual acuity can be beneficial.

Conclusion

Secondary lens implantation significantly improved vision in aphakic children. Young patients and those with nontraumatic cataracts demonstrated more favorable visual outcomes

References

1. Infant Aphakia Treatment Study Group, Lambert SR, Lynn MJ, Hartmann EE, DuBois L, Drews-Botsch C et al. Comparison of contact lens and intraocular lens correction of monocular aphakia during infancy: a randomized clinical trial of HOTV optotype acuity at age 4.5 years and clinical findings at ae 5 years. JAMA Ophthalmol 132 (2014): 676–682.
2. Infant Aphakia Treatment Study Group, Lambert SR, Buckley EG, Drews-Botsch C, DuBois L, Hartmann E et al.The infant aphakia treatment study: design and clinical measures at enrollment. Arch Ophthalmol 128 (2010): 21–27.
3. Chiquet C, Zech JC, Gain P, Adeleine P, Trepsat C. Visual outcome and prognostic factors after magnetic extraction of posterior segment foreign bodies in 40 cases. Br J Ophthalmol 7 (1998): 801-806.
4. Doskova H, Vlkova E. Surgical treatment of combined injuries of the anterior and posterior segment of the eye with intraocular metallic foreign body. Ceska a slovenska oftalmologie: casopis Ceske oftalmologicke spolecnosti a Slovenske oftalmologicke spolecnosti 62 (2006): 42-47.
5. Riazi M, Moghimi S, Najmi Z, Ghaffari R. Secondary Artisan- Verysise intraocular lens implantation for aphakic correction in post-traumatic vitrectomized eye. Eye (Lond) 22 (2008): 1419-1424.
6. Chorągiewicz T, Nowomiejska K, Wertejuk K, et al. Surgical treatment of open globe trauma complicated with the presence of an intraocular foreign body. Klin Oczna 117 (2015): 5-8.
7. Besek NK, Nacaroglu SA, Er MO, et al. The Effect of Secondary Intraocular Lens Implantation Time on Visual Prognosis in Aphakia Cases after Open Globe Injury. Korean J Ophthalmol 35 (2021): 368-375.
8. Chuang LH, Lai CC. Secondary intraocular lens implantation of traumatic cataract in open-globe injury. Can J Ophthalmol 40 (2005): 454-459.
9. Vaegan, Taylor D. Critical period for deprivation amblyopia in children. Trans. Ophthalmol Soc UK 99 (1979): 432–9.
10. Elston J, Timms C. Clinical evidence for the onset of the sensitive period in infancy. Brit J Ophthalmol 76 (1992): 327–328
11. Wilson ME. Intraocular lens implantation: has it become the standard of care for children? Ophthalmology 103 (1996): 1719–1720.
12. Lambert SR, Drack AV. Infantile cataracts. Surv Ophthalmol 40 (1996): 427–458.
13. Lorenz B, Wörle J. Visual results in congenital cataract with the use of contact lenses. Graefes Arch. Clin. Exp. Ophthalmol 229 (1991): 123–132.
14. Nihalani BR, Vanderveen DK. Secondary intraocular lens implantation after pediatric aphakia. J AAPOS 15 (2011): 435–440.
15. Basti S, Ravishankar U, Gupta S. Results of a prospective evaluation of three methods of managementof pediatric cataracts Ophthalmology 103 (1996): 713–720.
16. Magli A, Forte R, Rombetto L. Long-term outcome of primary versus secondary intraocular lens implantationafter simultaneous removal of bilateral congenital cataract. Graefes Arch Clin Exp Ophthalmol 251 (2013): 309–314.
17. Kim DH, Kim JH, Kim SJ, Yu YS. Long-term results of bilateral congenital cataract treated with earlycataract surgery, aphakic glasses and secondary IOL implantation. Acta Ophthalmol 290 (2012): 231–36.
18. Wood KS, Tadros D, Trivedi RH, Wilson ME. Secondary intraocular lens implantation following infantile cataract surgery: intraoperative indications, postoperative outcomes. Eye (Lond) 30 (2016): 1182-1186.
19. Rong X, Ji Y, Fang Y, Jiang Y, Lu Y. Long-Term Visual Outcomes of Secondary Intraocular Lens Implantation in Children with Congenital Cataracts. PLoS One 10 (2015): e0134864.
20. Shenoy BH, Mittal V, Gupta A, Sachdeva V, Kekunnaya R. Complications and visual outcomes after secondary intraocular lens implantation in children. Am J Ophthalmol 159 (2015): 720–726.

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DOI:10.26502/fjor.2644-00240069

21. Hu S, Wang M, Xiao T, Zhao Z. Iris reconstruction combined with iris-claw intraocular lens implantation for the management of iris-lens injured patients. Indian J Ophthalmol 64 (2016): 216-221.

22. Forlini M, Soliman W, Bratu A, Rossini P, Cavallini GM, Forlini C. Long-term follow-up of retropupillary iris-claw intraocular lens implantation: a retrospective analysis. BMC Ophthalmol 15 (2015): 143.

23. Toro MD, Longo A, Avitabile T, et al. Five-year follow-up of secondary iris-claw intraocular lens implantation for the treatment of aphakia: Anterior chamber versus retropupillary implantation PLoS One 14 (2019): e0214140.

24. Thulasidas M. Retropupillary Iris-Claw Intraocular Lenses: A Literature Review. Clin Ophthalmol 15 (2021): 2727-2739.

25. He T, You C, Chen S, Meng X, Liu Y, Yan H. Secondary Sulcus-Fixed Foldable IOL Implantation with 25-G Infusion in Patients with Previous PPV after Open-Globe Injury. Eur J Ophthalmol 27 (2017): 786-790.

26. Liu JH, Li SF, Deng GD, Jiao YH, Lu H. Outcomes of secondary sulcus intraocular lens implantation in unilateral anterior persistent fetal vasculature. Int J Ophthalmol 12 (2019): 592-596.

27. Prakhunhungsit S, Berrocal AM. Diagnostic and Management Strategies in Patients with Persistent Fetal Vasculature: Current Insights. Clin Ophthalmol 14 (2014): 4325-4335.

28. Vasavada AR, Vasavada SA, Bobrova N, Praveen MR, Shah SK, Vasavada VA et al. Outcomes of pediatric cataract surgery in anterior persistent fetal vasculature. J Cataract Refract Surg 38 (2012): 849-857.

29. Yu T, Yu M, Wu W, et al. Outcomes and Complications of Sutured Scleral-Fixated Foldable Intraocular Lens Implantation: A Retrospective Study of 5-Year Follow-Up. J Ophthalmol (2021): 5525064.

30. Stem MS, Todorich B, Woodward MA, Hsu J, Wolfe JD. Scleral-Fixated Intraocular Lenses: Past and Present. J Vitreoretin Dis 1 (2017): 144-152.

31. Hsu HY, Edelstein SL, Lind JT. Surgical management of non-traumatic pediatric ectopia lentis: A case series and review of the literature. Saudi J Ophthalmol 6 26 (2012): 315-321.