ORIGINAL ARTICLE

CHARACTERISTIC OF SECONDARY INTRAOCULAR LENS IMPLANTATION IN APHAKIC CHILDREN IN CICENDO NATIONAL EYE HOSPITAL

Lina Shabrina Qorib S[1,3], Irawati Irfani[2,3], Maya Sari Wahyu[2,3], Feti Karfiati[2,3]
[1]Departement of Ophthalmology, Faculty of Medicine University of Padjadjaran
[2]Departement of Pediatric Ophthalmology, Faculty of Medicine University of Padjadjaran
[3]National Eye Center, Cicendo Eye Hospital

ABSTRACT

Background: Pediatric cataract is responsible for 200.000 of preventable blindness in children. Early cataract extraction and correction after the lens removal is critical. Secondary intraocular (IOL) implantation might be considered when the child is intolerant to contact lenses/spectacle wear. Only a few study has been done regarding secondary IOL implantation in aphakic children.

Objective: This study was aimed to describe the characteristic of secondary IOL implantation in aphakic children in Cicendo National Eye Hospital.

Methods: This retrospective observational study took samples from medical records of patients who underwent secondary IOL implantation in 2016 – 2020 in Cicendo National Eye Hospital.

Results: Fifty nine eyes of forty pediatric patients underwent secondary IOL implantation surgery between 2016 – 2020. Two patients were excluded. From the 38 patients, 56 eyes were observed. Total of 20 patients were boys (52.6%) and 71.1% cases were bilateral cataract with congenital cataract as the main initial diagnosis (47.4%). Mean age of secondary IOL implantation was 71 ± 35 (20–201) months. Mean duration between cataract surgery and secondary IOL implantation was 51 ± 36 (2 – 189) months . Total of 80.4% of the IOL were fixated in the sulcus. Only 25% remained present for more than 12 months follow up and 65.8% of patients were corrected with bifocal spectacles.

Conclusion: Secondary IOL implantation in aphakic children were mostly done in the age of six years old. Most of the IOL were fixated in the sulcus. Patients were mostly given bifocal spectacles.

Keywords: secondary intraocular lens, aphakia, pediatric cataract

INTRODUCTION

Pediatric cataract is known to be one of the major causes of preventable childhood blindness. About 200.000 children are blind from bilateral cataract globally. The management of cataract in children is quite challenging and intervention as early as possible is needed to prevent irreversible amblyopia. Children who are treated in the early childhood, especially in the first year of life, are suggested to be left aphakic.[1-4]

Early correction after the lens removal is also critical and can be accomplished through full time wear of either contact lenses or spectacles. Secondary intraocular implantation (IOL) might be considered when the child is intolerant to contact lenses or spectacle wear, or intended

to achieve functional vision without additional correction. IOL can provide a constant visual stimulus and served as a full time partial correction.[1,5-8]

The technical difficulty of secondary IOL implantation lays mainly on how good the capsular support was left behind at the primary cataract surgery. To the best of our knowledge, foldable acrylic IOL has demonstrated the longest track record of safety. The ciliary sulcus was the most common site of implantation for years, but the ideal site of IOL implantation is in the bag since it can maintain better IOL centration. However, only a few studies has been done regarding secondary IOL implantation in aphakic children, especially in Indonesia.[1,5,9] This study was aimed to describe the characteristic of secondary IOL implantation in aphakic children in Cicendo National Eye Hospital.

METHOD

This is a retrospective observational study of children who underwent secondary IOL implantation surgery between 2016 and 2020 in Pediatric Ophthalmology and Strabismus Unit in Cicendo National Eye Hospital. List of patients were obtained from chronological surgery list in the operating room, double checked with database obtained from the Information Technology (IT) division. Complete review of the medical records of all the children listed were done.

All pediatric patients who underwent secondary intraocular lens implantation surgery in Cicendo National Eye Hospital between 2016 and 2020 were included in this study. Exclusion criteria include patients with incomplete medical records especially those with incomplete data on the report of the surgery.

Variables taken in this study includes demographic data of the patients (age and sex), clinical presentation of the patient (laterality, nystagmus, type of cataract, main diagnosis), Type of surgery, site of IOL fixation, duration of follow up, and visual rehabilitation aid chosen after the surgery. Data obtained were analysed using Microsoft® Excel 2021.

RESULT

Fifty nine eyes of forty pediatric patients underwent secondary IOL implantation surgery between 2016 – 2020. Two patients (three eyes) were excluded due to incomplete medical records. From the 38 patients, 56 eyes were observed. Total of 52.6% (20/38) patients were boys, 71.1% (27/38) of patients were presented with bilateral cataract, 60.5% was accompanied with nystagmus (23/38), and 47,4% (18/38) were initially diagnosed as congenital cataract.

Total of 68.3% (26/38) of the patients had cataract surgery in Cicendo National Eye Hospital. The preoperative clinical characteristics secondary IOL implantation are listed in Table 1.

From all the 68.4% surgeries done in Cicendo National Eye Hospital, the mean age of the first cataract surgery was 19 ± 34 (3– 156) months. Mean age of secondary IOL implantation was 71 ± 35 (20–201) months. Mean duration between cataract surgery and secondary IOL implantation was 51 ± 36 (2 – 189) months. The timing of secondary IOL implantation in Cicendo National Eye Hospital are elaborated in table 2.

Table 1. Preoperative clinical characteristic of secondary IOL implantation

Clinical Characteristic	Number of Patients (N = 38)	Percentage (%)
Gender		
Boy	20	52.6
Girl	18	47.4
Laterality		
Unilateral	11	28.9
Bilateral	27	71.1
Nystagmus		
Yes	23	60.5
No	15	39.5
Type of Cataract		
Congenital Cataract	18	47.4
Developmental Cataract	2	5.3
Traumatic Cataract	6	15.8
Unknown Type of Cataract	12	31.5
Cataract Surgery done in Cicendo Eye Hospital		
Yes	26	68.4
No	12	31.6

The type of surgery, site, and duration of follow up of secondary IOL implantation surgery are summarized in table 3. Total of 30.4% were nuclear cataracts and 62.5% required combination of surgery which include membranectomy as additional surgical action besides secondary IOL implantation. Total of 80.4% of the IOL were fixated in the sulcus, while 19,6% were fixated in the bag.

After 12 months of surgery, only 25% of patients were present for the postoperative follow up visits. Some only came until 1 week after the surgery, and some still came until 3 years. Visual rehabilitation aid chosen after surgery were elaborated in table 4. Total of 65.8% of patients were corrected with bifocal spectacles and 15.8 were corrected with monofocal spectacles. Total of 17.1% patients were left uncorrected due to lost to follow up.

Table 2. Timing of secondary IOL implantation in Cicendo Eye Hospital

Parameters	Mean (Min–Max)
Age at the time of cataract surgery (mo)	19 ± 34 (3– 156)
Age at the time of secondary IOL implantation (mo)	71 ± 35 (20–201)
Duration between two surgeries (mo)	51 ± 36 (2 – 189)

Table 3. Type of surgery, site, and duration of follow up of secondary IOL implantation

Parameters	Number of Eyes (N = 56)	Percentage (%)
Type of Cataract		
Nuclear	17	30.4
Membranous	3	5.4
Lamellar	6	10.7
Polus Posterior	2	3.6
Cortical	1	1.8
Traumatic	5	8.9
Unknown	22	39.2
Type of Surgery		
Secondary IOL implantation	21	37.5
Secondary IOL implantation with Membranectomy	35	62.5
IOL Fixation		
In the bag	11	19.6
Sulcus	45	80.4
Duration of follow up (1 week – 3 years)		
< 12 months	42	75
≥ 12 months	14	25

Table 4. Visual Rehabilitation Aid After Surgery

Parameters	Percentage (%)
Bifocal spectacles	65,8
Monofocal spectacles	15,8
Uncorrected	17,1

DISCUSSION

Our result showed 71.1% of patients were presented with bilateral cataracts and the main initial diagnosis was congenital cataract (47.4%). The result of our study is similar to a study done by Rahi and Dezateux et al that stated that a high number of congenital cataracts (92%) were found in the United Kingdom and the incidence of bilateral cataracts was higher than unilateral cataracts (66%). The result was also in line with Romadhon et al that stated 63.42% of their subject suffered from bilateral congenital cataracts. The distribution of prevalence between both gender were not much different as well (41.46% boys, 58.54% girls) compared to our study (boys 52.6% and girls 47.4%). A lower number of patients (36.59%) were accompanied by nystagmus in their study compared to ours (60,5%). Nystagmus that is associated with bilateral cataracts might indicate that the opacities are visually significant.[10,11]

The timing of cataract extraction is at greater urgency in the younger child due to the higher risk of deprivative amblyopia. The mean age at the first cataract surgery at Cicendo National Eye Hospital was 19 ± 34 months. This high number of averages is due to the fact that some of the samples underwent cataract surgery at the age of 3 months while others at the age of 156 months old. A high range of the timing of surgery was found because children had a different type of cataract at their initial presentation. Besides congenital cataracts, there are patients presented initially in the outpatient clinic with developmental cataracts (5,3%), traumatic cataracts (15,8%), and aphakia (31,5%). The mean age of secondary IOL implantation was 71 ± 35 months. This fits the age where most children enter primary school. This result matches the study done by Wood et al that showed the average age at secondary IOL implantation was at the age of 55.2 ± 21.6 months. They stated that the parents might choose this range of timing due to the burden of the thick aphakic spectacles and difficulties in wearing contact lenses accompanied with the psychological burden that might occur. [12,13]

A total of 80.4% of the IOL were fixated in the sulcus. This is due to the feasibility of the operator and previous studies stated that IOL implantation in the capsular bag is related to a smaller number of complications compared to sulcus implantation. However, Zhu et al stated that there was no significant difference in both postoperative complications and visual acuity between secondary in the bag IOL implantation or secondary sulcus IOL implantation.[14- 17]

A total of 65.8% of patients were corrected with bifocals spectacles and 15.8 were corrected with monofocal spectacles. The main concern is that 75% of the patients did not return for the routine postoperative checkup. This resulted in 17.1% of the patients remaining visually uncorrected. These patients are in a great risk of developing deprivative amblyopia.[7,14]

The limitation of this study was the incomplete medical records. Another concern of this study is the high number of losses to follow-up. The transition from paper to e-medical records might assure the completeness of data. Further research is needed to assess the long term safety and effectiveness of secondary IOL implantation in aphakic children in Cicendo National Eye Hospital.

CONCLUSION

Secondary IOL implantations in aphakic children in Cicendo National Eye Hospital were mostly done in children age around six years old. The most surgical action taken was secondary IOL implantation with membranectomy. Most of the IOLs were fixated in the sulcus. Patients were mostly given bifocals spectacles as visual rehabilitation aid. However, most of the patients did not show up after 12 months of surgery so a number of patients remained visually

uncorrected. Further research is needed to assess the long-term safety and effectiveness of secondary IOL implantation in children in Cicendo National Eye Hospital.

REFERENCE

1. AAO. Pediaric Cataract - Europe [Internet]. 2015. Available from: https://www.aao.org/topic-detail/pediatric-cataract-europe
2. Medsinge A, Nischal KK. Pediatric cataract: Challenges and future directions. Clin Ophthalmol. 2015;9:77–90.
3. Lambert SR, Lynn MJ, Hartmann EE, DuBois L, Drews-Botsch C, Freedman SF, 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 age 5 years. JAMA Ophthalmol. 2014;132(6):676–82.
4. Lambert SR, Aakalu VK, Hutchinson AK, Pineles SL, Galvin JA, Heidary G, et al. Intraocular Lens Implantation during Early Childhood: A Report by the American Academy of Ophthalmology. Ophthalmology [Internet]. 2019;126(10):1454–61. Available from: https://doi.org/10.1016/j.ophtha.2019.05.009
5. Trivedi RH, Wilson ME, Facciani J. Secondary intraocular lens implantation for pediatric aphakia. J AAPOS. 2005;9(4):346–52.
6. Koch CR, Kara-Junior N, Serra A, Morales M. Long-term results of secondary intraocular lens implantation in children under 30 months of age. Eye [Internet]. 2018;32(12):1858–63. Available from: http://dx.doi.org/10.1038/s41433-018-0191-3
7. 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. 2015;10(7):1–10.
8. Mohamed T, Eldin Zaki R, Hashem M. Primary versus secondary intraocular lens implantation in the management of congenital cataract. J Egypt Ophthalmol Soc. 2016;109(2):54.
9. Nihalani BR, Vanderveen DK. Secondary intraocular lens implantation after pediatric aphakia. J AAPOS [Internet]. 2011;15(5):435–40. Available from: http://dx.doi.org/10.1016/j.jaapos.2011.05.019
10. Romadhon AS, Susanto J, Loebis R. The Comparison of Visual Acuity After Congenital Cataract Surgery between Children ≤2 Years and >2-17 Years. Biomol Heal Sci J. 2020;3(2):70.
11. Rahi J, Dezateux C. Measuring and Interpreting the Incidence of Congenital Ocular Anomalies: Lessons from a National Study of Congenital Cataract in the UK. Invest Ophthalmol Vis Sci. 2001;42:1444–8.
12. Wood KS, Tadros D, Trivedi RH, Wilson ME. Secondary intraocular lens implantation following infantile cataract surgery: Intraoperative indications, postoperative outcomes. Eye [Internet]. 2016;30(9):1182–6. Available from: http://dx.doi.org/10.1038/eye.2016.131
13. AAO. Pediatric Ophthalmology and Strabismus. Acad Med. 2020;7(4):286.
14. DeVaro JM, Buckley EG, Awner S, Seaber J. Secondary posterior chamber intraocular lens implantation in pediatric patients. Am J Ophthalmol [Internet]. 1997;123(1):24–30. Available from: http://dx.doi.org/10.1016/S0002-9394(14)70988-2
15. Enyedi LB, Peterseim MW, Freedman SF, Buckley EG. Refractive changes after pediatric intraocular lens implantation. Am J Ophthalmol. 1998;126(6):772–81.
16. Moore DB, Ben Zion I, Neely DE, Roberts GJ, Sprunger DT, Plager DA. Refractive outcomes with secondary intraocular lens implantation in children. J AAPOS [Internet]. 2009;13(6):551–4. Available from: http://dx.doi.org/10.1016/j.jaapos.2009.09.012
17. Zue X, Xin X, Zao X, Gong X. Comparison of effects of secondary in in-the-bag and sulcus intraocular lens implantation in pediatric aphakia after congenital cataract operation. Zhonghua Yan Ke Za Zhi. 2013 Aug;49(8):700-5.