DOI: 10.4274/tjo.galenos.2023.50951
Turk J Ophthalmol 2023

Original Article

Predictive Factors of Complications and Visual Outcomes after Pediatric Cataract Surgery: A Single Referral Center Study from Turkey

Volkan Dericioğlu, Mehmet Orkun Sevik, Elif Bağatur Vurgun, Eren Çerman

Marmara University Faculty of Medicine, Department of Ophthalmology, İstanbul, Turkey

Abstract

Objectives: To evaluate the predictive factors of developing complications and visual acuity outcomes in pediatric cataract patients.

Materials and Methods: This retrospective, observational clinical study included 80 eyes 50 patients treated for pediatric cataracts between 2010 and 2020. The eyes were divided into Group-I (congenital cataracts, n=38) and Group-II (developmental cataracts, n=42). Group-II was also divided into Group-IIA (aphakic, n=21) and Group-IIB (pseudophakic, n=21). The effects of the age, laterality, cataract morphology, IOL implantation, preoperative nystagmus/strabismus, and intraoperative anterior hyaloid rupture on complications and final best-corrected visual acuity (BCVA; logMAR) were evaluated.

Results: The median (interquartile range) age and follow-up time were 28(5-79) and 60(29-84) months, respectively. There was a significant difference in mean final BCVA between Group-I (0.79±0.46) and Group-II (0.57±0.51) (p=0.047); however, no difference was observed between Group-IIA and Group-IIB (p=0.541). Having a congenital cataract (p=0.045), preoperative nystagmus/strabismus (p=0.042), total/mature cataract (p<0.001), and postoperative complications (p=0.07) were significantly associated with final BCVA. However, multivariate analysis revealed that only having total/mature cataract (β=0.52, p<0.001) and any complications (β=0.24, p=0.018) were associated with final BCVA. Having a congenital cataract and intraoperative anterior hyaloid rupture were the only significant risk factors of postoperative complications on univariate (p=0.027 and p=0.003, respectively) and binary logistic regression analysis (OR: 2.95 [95%CI: 1.07, 8.15], p=0.036 and OR: 4.28 [95%CI: 1.55, 11.77], p=0.005, respectively).

Conclusion: The total/mature cataract and presence of any postoperative complication were adversely affected the final BCVA. Having a congenital cataract and unintentional intraoperative anterior hyaloid membrane rupture was increased the risk of complication.

Keywords: Pediatric cataract, congenital cataract, developmental cataract, surgery, complication, visual outcomes

INTRODUCTION

The factors affecting the long-term outcomes of congenital and developmental pediatric cataracts are frequently studied in the literature, in which the age at surgery, bilaterality, and intraocular lens (IOL) implantation are the most commonly investigated parameters.[1-3] While congenital and unilateral cataracts were generally accepted to affect the visual outcomes, recent long-term studies with IOL implantation and aphakic treatment resulted in comparable success rates in final visual acuity.[1-3] However, making a prospective observation and definite decision about all factors influencing final visual acuities such as cataract morphology, preoperative nystagmus or strabismus, and occlusion therapy compliance is challenging.

The most common complications after pediatric cataract surgeries are inflammatory reactions in the anterior chamber and visual axis opacifications (VAO), and one of the most severe complications is secondary glaucoma.[4-7] In addition, complications after pediatric cataract surgeries result in worse visual outcomes; therefore, it is essential to acknowledge and manage the factors associated with complication development.[1, 8] For this purpose, the most commonly investigated parameters are the age at diagnosis, anterior vitrectomy, IOL implantation, and techniques of IOL implantation.[9-14]

Therefore, our study aims to evaluate the effects of age at diagnosis, laterality, cataract morphology, preoperative

Address for Correspondence: Eren Çerman, Marmara University Faculty of Medicine, Department of Ophthalmology, İstanbul, Turkey
E-mail: erencerman@yahoo.com **ORCID-ID:** orcid.org/0000-0002-8681-9214
Received: 16.06.2022 **Accepted:** 26.02.2023

Cite this article as: Dericioğlu V, Sevik MO, Bağatur Vurgun E, Çerman E. Predictive Factors of Complications and Visual Outcomes after Pediatric Cataract Surgery: A Single Referral Center Study from Turkey

nystagmus or strabismus, IOL implantation, and intraoperative unintentional anterior hyaloid rupture on complication rates and best-corrected visual acuities after pediatric cataract surgeries.

MATERIALS AND METHODS

Study Design and Patients

This single-center, retrospective, observational study includes congenital and developmental pediatric cataract patients presented to the Pediatric Ophthalmology and Strabismus Unit of the Department of Ophthalmology at xxx University School of Medicine Hospital, xxx, Istanbul between January 2010 and January 2020. The Institutional Review Board of xxx University School of Medicine approved the study protocol (No:09.2020.1169), and the study was conducted following the Declaration of Helsinki principles. All patients' legal guardians routinely provided written informed consent about using their medical information in the study analysis at their first presentation and before the individual interventions.

The records of the patients diagnosed with congenital and developmental cataracts were retrospectively reviewed, and eligible patients were included in the study. The exclusion criteria were: developmental cataracts after the age of 18, traumatic or uveitic cataracts, being untreated despite having cataracts, having cataract surgery at another center, having ocular comorbidities, having a secondary IOL implantation, lack of consistent or adequate medical records, having a follow-up <1 year, and inability to obtain final visual acuity. Demographic features and clinical characteristics of the patients such as sex, laterality (unilateral or bilateral), cataract morphology (lamellar-cortical, total/mature, posterior polar, posterior subcapsular, anterior polar, nuclear, and oil drop), age at the diagnosis (months), age at the surgery (months), time from diagnosis to surgery (months), and follow-up time (months) were recorded.

Surgical Indication and Technique

All patients underwent a comprehensive preoperative ophthalmologic examination, including evaluation of best-corrected visual acuity (BCVA) with the HOTV, Snellen, or Tumbling "E" charts if possible, intraocular pressure (IOP) with TONO-PEN XL (Hagg-Streit, Koeniz, Switzerland) or Goldmann applanation tonometry depending on the patient's age, dilated fundus examination, retinoscopy with cycloplegia, keratometry, and B-scan ultrasonography if indicated. Any visually significant cataracts with a risk of deprivation amblyopia were considered an indication for cataract surgery.

All surgeries were performed under general anesthesia by the same experienced surgeon (EÇ). Two side port incisions were made at 2 and 10 clock hours, and the anterior chamber was filled with a cohesive ophthalmic viscoelastic device (OVD). A 5-5.5mm anterior continuous curvilinear capsulorrhexis (CCC) was generated with micro-forceps. Then, lenticular material was aspirated by bimanual irrigation aspiration. After lenticular material clearance, a small incision was made at the posterior capsule with a cystotomy cannula. Next, the Berger space was filled with dispersive OVD to prevent anterior hyaloid membrane rupture, and posterior CCC was completed with micro-forceps. Finally, a 23-gauge anterior vitrectomy was performed if the anterior hyaloid was ruptured unintentionally during the surgery with any vitreous prolapse into the anterior chamber.

A three-piece hydrophobic acrylic IOL was implanted in the capsular bag or the sulcus for patients through a 2.4 mm main incision as primary IOL implantation if only the patient is over 12 months old and the caregivers thought they would have some problems using contact lenses or glasses on their children due to socio-economic difficulties; otherwise, the patients left aphakic.

Then, all incisions were sutured with 10-0 nylon or vicryl sutures. Postoperative therapy included topical moxifloxacin and prednisolone for one month.

Postoperative Complications and Visual Acuity

The follow-up examinations were performed on one day, one week, one month, and three months after the surgery and then at an interval of 3 to 6 months. All follow-up visits included BCVA assessment (if possible), IOP measurement, slit-lamp biomicroscopy, retinoscopy, and dilated fundus examinations. The patients' final BCVA in decimal or Snellen values were converted to the logarithm of the minimum angle of resolution (logMAR) for statistical analysis. The appropriate contact lens corrections for the aphakic patients and spectacle corrections for the pseudophakic patients were prescribed on postoperative week one and controlled by regular retinoscopy at 3 to 6 months intervals. In addition, occlusion therapy was applied for all unilateral cases and for the bilateral cases with significant anisometropia.

The postoperative complications noted were as follows: posterior synechia, defined as an adhesion between the iris and IOL or IOL capsule preventing the iris dilatation; VAO, capsular or anterior vitreous opacification obscuring retinal examination; fibrinous membrane, a membrane covering the pupil; IOP-spike, defined as an elevation in IOP within postoperative one-week requiring medication; and secondary glaucoma was determined using The British Infantile and Childhood Glaucoma Eye Study criteria.[15] A second surgery was performed in any complication obscuring the visual axis that can cause amblyopia and in secondary glaucoma unresponsive to medical treatment.

The possible predictive factors for postoperative complications and final BCVA were determined as age at the surgery, laterality (unilateral or bilateral), IOL implantation, cataract morphology, preoperative nystagmus or strabismus, and intraoperative unintentional anterior hyaloid rupture.

To better present the effects of age and intraoperative IOL implantation on complication rates and final BCVA, the eyes were divided into Group- I (≤12 months; congenital cataracts) and Group-II (>12 months; developmental cataracts) according to the age of diagnosis and treatment. Also, Group-II was divided into Group-IIA (aphakic) and Group-IIB (pseudophakic) subgroups according to intraoperative IOL implantation.

Statistical Analysis

The SPSS for Macintosh version 24.0 (IBM Corp., Armonk, NY, USA) was used to analyze the data. The data distribution

was assessed with the Kolmogorov-Smirnoff test and histogram graphs; descriptive data were presented as the median and interquartile range (IQR). However, despite its nonparametric distribution, BCVA values were given as mean±standard deviation (SD) for a better presentation of data. Pearson's chi-square test and Bonferroni correction were used to compare the categorical variables for two or three group comparisons. Independent samples with two or more groups were compared with the Mann-Whitney U or the Kruskal-Wallis tests, respectively. Pairwise comparisons were used for post-hoc tests. A linear regression analysis, including variables significant at 0.1 level in univariate analysis, was employed to evaluate the most effective predictive factors for BCVA. In the case of the factors correlated at the level of 0.4 or higher, only the most significantly affected one was included in the regression analysis. Cohen's-D and Phi-coefficiency tests were used to determine the effect size of continuous and categorical data, respectively. A chi-square test was performed for univariate analysis of risk factors for complication development. Risk factors that were determined to be significant in these analyses were also evaluated by binary logistic regression analysis. The odds ratios and 95% confidence intervals (95%CI) of risk factors were assessed for independent risk factors. A p-value of less than 0.05 was considered statistically significant.

RESULTS

There were 99 patients (161 eyes) with pediatric cataracts during the study period. After excluding the non-eligible patients, 50 patients (80 eyes) were included in the study analysis (Figure 1). Of them, 22 patients (38 eyes) were diagnosed with congenital cataracts before the age of 12 months, treated with cataract extraction, left aphakic, and their refractive error was corrected with contact lenses (Group-I), and 28 patients (42 eyes) were diagnosed with developmental cataracts after the age of 12 months and treated with cataract extraction (Group-II). Among the patients in Group-II, 14 patients (21 eyes) had left aphakic and were treated with contact lens correction (Group-IIA), and 14 patients (21 eyes) had primary IOL implantation during the cataract surgery (Group-IIB). The overall median follow-up time was 60 (29-84) months. The demographical and clinical data of the groups are presented in Table 1.

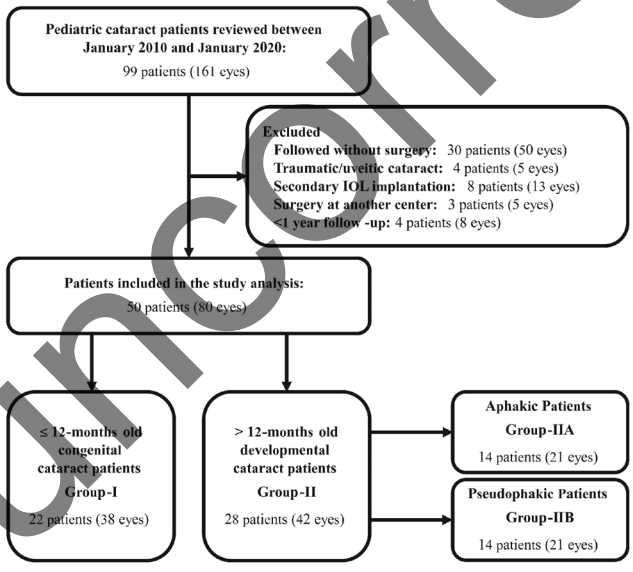

Figure 1: The flowchart of the study enrollment.
IOL, intraocular lens.

The Final Visual Acuity

The final BCVA of Group-II was significantly better than Group-I (0.57±0.5 vs. 0.79±0.5, p=0.020, Cohen's D:0.48, respectively). However, there was no significant difference in three-group comparisons (p=0.051).

Considering the predictive factors of the final BCVA, a slight negative correlation was found between the final BCVA and the age at the time of surgery (r=-0.280, p=0.012). The median (IQR, min-max) age at the diagnosis was significantly higher in unilateral than bilateral cases (37 [69, 3-116] vs. 9 [49, 1-124] months, p=0.035); however, there was no significant difference in time from diagnosis to operation (1.5 [12, 0-46] and 1 [4, 0-60] months, p=0.277) and the final BCVA (0.73±0.35 and 0.66±0.54, p=0.291, Cohen's D:0.14). The eyes with preoperative nystagmus or strabismus had significantly worse final BCVA than the other eyes (0.81±0.45 vs. 0.58±0.50, p=0.020, Cohen's D:0.48).

The cataract morphologies were lamellar-cortical in 21 (26.3%), total/mature in 20 (25%), posterior polar in 18 (22.5%), posterior subcapsular in 9 (11.3%), anterior polar in 5 (6.3%), nuclear 4 (5%), and oil drop in 3 (3.8%) eyes. Although there is a significantly shorter median diagnosis to operation time for total/mature cataracts than other cataract morphologies (0 [0-1.5] vs. 3 [0-9] months, p=0.001), only total/mature cataracts had a moderate positive correlation with final BCVA (r=0.480, p<0.001). The mean final BCVA of the total/mature cataract eyes was 1.11±0.58, which was significantly worse than the mean BCVA of the other morphologies (0.53±0.37, p<0.001, Cohen's D:1.17). Ninety percent (n=18) of the total/mature cataracts were bilateral, and there was no significant difference in final BCVA of total/mature cataracts between Group-I (1.15±0.53, n=12) and Group-II (1.05±0.69, n=8) (p=0.295).

The pseudophakic eyes had a significantly better final BCVA than the aphakic eyes (0.49±0.40 vs. 0.65±0.59, p=0.043, Cohen's D:0.55) considering the whole study population (Group-I and II); however, there was no significant difference between the pseudophakic and aphakic eyes in developmental cataracts (Group-II) (p=0.541).

The mean final BCVA of the eyes with anterior vitrectomy was 0.75±0.54, and there was no significant difference with the eyes with an intact hyaloid membrane (0.63±0.47, p=0.263, Cohen's D:0.22).

Aphakic treatment was performed in 59 eyes with a mean final BCVA of 0.74±0.5. There was no significant difference between aphakic congenital and developmental cataract patients in final BCVA (0.79±0.46 and 0.65±0.59, respectively, p=0.153).

Table 1. Demographical and clinical characteristics of the patients

	Group I n=22 (38 eyes)	Group II			p-values		
		Group II Total n=28 (42 eyes)	Group IIA n=14 (21 eyes)	Group IIB n=14 (21 eyes)	p_1[a]	p_2[b]	Post-hoc test[c]
Sex, n (eyes) Female Male	 13 (20) 9 (18)	 12 (16) 16 (26)	 7 (11) 7 (10)	 5 (5) 9 (16)	 0.192	 0.076	 NA
Age at Diagnosis, months Median (IQR)	4 (2-5)	62 (36-80)	52 (43-72)	76 (32-94)	<0.001*	<0.001*	Group I vs. IIA, p<0.001* Group I vs. IIB, p<0.001*
Age at Surgery, months Median (IQR)	5 (3-8)	74 (49-85)	52 (52-76)	80 (32-102)	<0.001*	<0.001*	Group I vs. IIA, p<0.001* Group I vs. IIB, p<0.001*
Time to Surgery, months Median (IQR)	0.5 (0-2.5)	5 (0-12)	4 (0-6)	4 (0-12)	0.012*	0.020*	Group I vs. IIB, p=0.017*
Follow-up, months Median (IQR)	68 (46-102)	42 (18-72)	24 (12-54)	60 (32-93)	<0.001*	<0.001*	Group I vs. IIA, p<0.001* Group IIA vs. IIB, p=0.004*
Laterality, eyes (%) Bilateral Unilateral	 32 (84.2) 6 (15.8)	 28 (66.7) 14 (33.3)	 14 (66.7) 7 (33.3)	 14 (66.7) 7 (33.3)	 0.123	 0.194	 NA
Cataract Morphology, eyes (%) Lamellar-Cortical Total/Mature Posterior Polar Posterior Subcapsular Anterior Polar Nuclear Oil Drop	 12 (31.6) 12 (31.6) 9 (23.7) 2 (5.3) 2 (5.3) 0 (0.0) 1 (2.6)	 9 (21.4) 8 (19) 9 (21.4) 7 (16.7) 3 (7.1) 4 (9.5) 2 (4.8)	 0 (0.0) 6 (28.6) 5 (23.8) 3 (14.3) 3 (14.3) 2 (9.5) 2 (9.5)	 9 (42.9) 2 (9.5) 4 (19) 4 (19) 0 (0.0) 2 (9.5) 0 (0.0)	 NA	 NA	 NA
Preoperative Nystagmus or Strabismus, eyes (%)	21 (65.8)	12 (28.6)	4 (19)	8 (38.1)	0.015*	0.024*	Group I vs. IIA, p=0.021*
Unintentional Anterior Hyaloid Rupture, eyes (%)	16 (42.1)	15 (35.7)	9 (42.9)	6 (28.6)	0.558	0.072	NA
Presence of Any Complication, eyes (%)	18 (47.4)	10 (23.8)	4 (19)	6 (28.6)	0.027*	0.071	NA
Final BCVA, logMAR Mean ± SD	0.79 ± 0.46	0.57 ± 0.51	0.65 ± 0.59	0.49 ± 0.40	0.020*	0.051	NA

BCVA best-corrected visual acuity, IQR interquartile range, logMAR logarithm of the minimum angle of resolution, NA not applicable, SD standard deviation
p^1 Group I vs. II
p^2 Group I vs. IIA vs. IIB
[a] Mann-Whitney U test and Chi-square test were used for continuous and categorical p1 values, respectively
[b] Kruskal-Wallis test and Chi-square test were used for continuous and categorical p2 values, respectively
[c] Statistically significant p-values obtained from Kruskal-Wallis pairwise comparisons and Chi-square with Bonferroni correction for continuous and categorical variables, respectively
* Statistical significance

The univariate analysis showed that having a congenital cataract (β= 0.226 [95%CI: 0.01, 0.44], p=0.044), presence of preoperative nystagmus or strabismus (β= 0.229 [% CI: 0.01, 0.45], p=0.041), total/mature cataract morphology (β= 0.509 [95%CI: 0.28, 0.62], p<0.001) and development of any complication (β= 0.204 [95%CI: -0.02, 0.41], p=0.070), was significantly associated with final BCVA (Table 2). However, the multivariate analysis revealed that only total/mature cataract morphology (β=0.59 [95%CI: 0.37, 0.81], p<0.001) and development of any complication (β=0.243 [95%CI: 0.04, 0.45], p=0.018) was significantly associated with final BCVA (Table 2).

The Complications

The complication rates of groups are given in Table 3. There were significantly more complications in Group-I (n=18; 47.4%) than in Group-II (n=10, 23.8%) (p=0.028, Phi-coefficiency:-0.25); however, there was no significant difference in the three group comparisons (Group-I vs. Group-IIA vs. Group-IIB, p=0.118). A second surgery was required in 18 eyes (22.5%) with indications of VAO in 8 (44.4%), fibrinous membrane in 5 (27.7%), secondary glaucoma in 3 (16.7%), and posterior synechia in 2 (11.1%) eyes. The rest of the complications (n=10, 12.5%) were treated medically.

Considering the predictive factors separately, a slight negative correlation was found between the development of complications and the age at the time of surgery in months (r=-0.265, p=0.018). Complications occurred in 6 eyes (28.6%) with IOL implantation. Furthermore, complications were seen in 22

eyes (37.2%), and no statistical difference was observed between IOL implantation and aphakia in complication development (p=0.472, Phi-coefficiency:0.47). Complications were seen in 17 eyes (54.8%) in which anterior hyaloid membrane unintentionally ruptured during surgery, and 9 (29%) of them required a second surgery. Unintentional anterior hyaloid membrane rupture had a significant correlation with complication development (r=0.331, p=0.003), but not with a second surgery (r=0.124, p=0.271). In addition, there was a moderate positive correlation between the development of complications and intraoperative unintentional anterior hyaloid rupture (r=0.331, p=0.003). However, there was no correlation with bilaterality (r=-0.121, p=0.285), primary IOL implantation (r=-0.08, p=0.478), and presence of preoperative nystagmus and strabismus (r 0.130, p=0.249).

Univariate analysis showed that having a congenital cataract (β= -0.247 [95%CI: -0.49, -0.03], p=0.027) and unintentional intraoperative anterior hyaloid rupture (β= 0.331 [95%CI: 0.12, 0.56], p=0.003) were significantly associated with the development of complications (p=0.027 and p=0.003, respectively). Binary logistic regression analysis (Omnibus Test: 0.0001, Nagelkerke R^2: 0.211) was also showed that having a congenital cataract (OR: 2.95 [95%CI: 1.07, 8.15], p=0.036) and unintentional intraoperative anterior hyaloid rupture (OR: 4.28 [95%CI: 1.55, 11.77], p=0.005) increased the risk of development of complications.

DISCUSSION

In this study, total/mature cataract morphology and development of postoperative complications were significantly associated with final BCVA after pediatric cataract surgery. In addition, having a congenital cataract and unintentional intraoperative anterior hyaloid rupture leading to anterior vitrectomy were increased the risk of postoperative complication development.

Total/mature cataracts are among the most common pediatric cataracts, with a worse visual prognosis, and early surgical intervention is recommended to prevent deprivation amblyopia.[16-19] The overall final BCVA of the total/mature cataract eyes in our study (1.11±0.58 logMAR) was comparable with the mean BCVA of the study conducted by Zhang et al.[20] reported on 156 eyes (1.07±0.53 logMAR), and slightly worse than the study conducted by Lin et al.[21] (0.89±0.30 logMAR, n=88 eyes). Although we found a significantly shorter diagnosis to operation time for total/mature cataracts, regression analysis revealed that the total/mature cataract is significantly associated with worse final BCVA. Among the eyes with a final BCVA of worse than 1.0 logMAR, total/mature cataract morphology accounted for 54.8% (17/31), which was 85% (17/20) of the eyes with total/mature cataracts. That might have been caused by severe obscuration of visual stimulus by total/mature cataracts rather than other cataract morphologies, leading to profound deprivation amblyopia, which is generally more severe than strabismic or anisometropic amblyopia.[22]

Table 2. Univariate analyses and linear regression analysis for predicting factors of postoperative visual outcomes

Variables[a]	Univariate Analyses	Multivariate Analysis				
	p	B	95% CI	β	t	p
Constant[b]		0.365	0.21, 0.52		4.81	<0.001*
Total Cataract Morphology	<0.001*	0.588	0.37, 0.81	0.52	5.40	<0.001*
Presence of Any Complication	0.070*	0.243	0.04, 0.45	0.24	2.40	0.018*
Nystagmus or Strabismus	0.042*	0.130	-0.06, 0.32	1.30	1.33	0.187
Congenital Cataract	0.045*	0.058	-0.14, 0.26	0.06	0.58	0.563

CI confidence intervals for B, *IOL* intraocular lens
[a] Factors were ordered as the significance level of linear regression analysis
[b] R^2_{Adj} = 0.318 (n = 80, p < 0.001); F [6, 75] = 10.214, p < 0.001
* Statistical significance

Table 3. The distribution of complications for evaluated groups and according to intraoperative anterior hyaloid status

Complications	Group I (n=38 eyes)	Group IIA (n=21 eyes)	Group IIB (n=21 eyes)	Intact Anterior Hyaloid (n=49 eyes)	Ruptured Anterior Hyaloid (n=31 eyes)	Total (n=80 eyes)
Posterior synechia, eyes (%)	6 (15.8)	1 (5.9%)	2 (9.5)	4 (8.9)	5 (16.1)	9 (11.3)
Capsular opacification, eyes (%)	4 (10.5)	0 (0.0)	4 (19.0)	4 (8.9)	4 (12.9)	8 (10)
Pupillary membrane, eyes (%)	4 (10.5)	1 (4.8)	0 (0.0)	1 (2.2)	4 (12.9)	5 (6.3)
Intraocular pressure spike, eyes (%)	1 (2.6)	2 (9.5)	0 (0.0)	1 (2.2)	2 (6.5)	3 (3.8)
Secondary glaucoma, eyes (%)	3 (7.9)	0 (0.0)	0 (0.0)	1 (2.2)	2 (6.5)	3 (3.8)

In our study, the development of any complication was also associated with final BCVA, which supports the published literature.[1, 8] In our study, the overall complication rate was 35% (28/80 eyes), with a 22.5% (n=18) second surgery rate. These rates are comparable with the Pediatric Eye Disease Investigator Group study, with a complication rate of 33.6% excluding amblyopia and a second surgery rate of 17% in 1132 eyes.[23] We found that having a congenital cataract diagnosed and treated before 12 months of age is a significant risk factor for complications. Studies in the literature also report that the younger age is associated with an increased complication risk.[4, 5] Studies have recently focused on the relationship between surgery at a younger age with or without primary IOL implantation and the development of secondary glaucoma.[24-26] Solmaz et al. reported a significantly lower mean age at surgery in patients who developed glaucoma; however, they did not observe a difference in glaucoma incidence between aphakic and pseudophakic cases.[27] We observed secondary glaucoma only in 3 eyes (3.75%) in the aphakic congenital cataract group. Although the reported secondary glaucoma rates vary between 2-58% in the literature,[28] our lower rate was comparable with the multicenter study reported by Nagamoto et al.[29] (3.54%; 25/706 eyes), which was also significantly higher in aphakic patients (p=0.003).

VAO was developed in a total of 8 eyes (10%) with comparable rates between the eyes that have only posterior CCC (n=4, 8.2%) and posterior CCC with anterior vitrectomy (n=4, 12.9%) (p=0.491) in our study. The incidence of VAO was reported 100% in eyes without posterior CCC, which was reduced by performing posterior CCC and anterior vitrectomy.[18, 30, 31] Biler et al. reported that while VAO was seen in 34.3% of the eyes (n=23/67) that underwent posterior capsulotomy and anterior vitrectomy, the incidence of VAO in eyes without posterior capsulotomy was 76.4% (n=26/34).[32] Similarly, Batur et al. found a 70% incidence of posterior capsular opacification and 50% VAO in eyes without posterior CCC. [33] A recently published meta-analysis including 11 randomized controlled trials concluded that anterior vitrectomy minimizes the risk of VAO in pediatric cataracts;[9] however, in our study, the positive effect of including anterior vitrectomy to the posterior CCC on VAO could not be demonstrated as other previous studies.[10-12]

Hosal et al.[13] found that only age at surgery was significantly associated with membrane formation after pediatric cataract surgery, with a 4.74 fold increase in patients before one year of age. We also observed a higher rate of membrane formation in patients before 12 months of age (Group-I, congenital cataracts) (10.5% vs. 2.3%, compared to Group-II, p=0.105). There was also a higher rate of membrane formation in eyes with an unplanned intraoperative anterior hyaloid rupture leading to anterior vitrectomy (12.9% vs. 2.2%, compared to intact anterior hyaloid membrane, p=0.051) in our study. In contrast, Hosal et al.[13] supposed that primary posterior CCC combined with a planned anterior vitrectomy protective against secondary membrane formation. In a recent study eliminating the interpersonal inflammatory factors among the patients by applying posterior CCC without anterior vitrectomy and posterior IOL capture in one eye and posterior CCC with anterior vitrectomy and in-the-bag IOL implantation in the other eye of the same patient, Kaur et al.[14] observed significantly more inflammatory complications in the anterior vitrectomy group (p=0.004). They hypothesized that anterior vitrectomy might contribute to fibrinous complications.[14] We thought that an uncontrolled rupture of the anterior hyaloid membrane might result in more interactions between the anterior vitreous and aqueous humor, causing more inflammatory and fibrinous reactions in the anterior chamber.

The main limitations of our study are its retrospective nature and limited sample size. However, the effect sizes of statistical comparisons were given to determine the difference between factors regardless of the number of cases. Although the results are not sufficient to be generalized, they have illuminating aspects in revealing the factors associated with final visual acuity and the development of complications in pediatric cataracts.

CONCLUSION

In conclusion, this retrospective, observational, single-center study revealed that the total/mature cataract morphology and presence of any postoperative complications were adversely affected the final visual acuity in pediatric cataract cases. Moreover, having a congenital cataract and unintentional intraoperative anterior hyaloid membrane rupture was independently increased the risk of complications in these patients.

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