博 士 学 位 論 文

小児白内障における乱視矯正眼内レンズの有効性およびオプティックキャプチャー法による軸アライメント不良の防止

立　花　都　子

Doctoral Dissertation

Efficacy of Toric Intraocular Lens and Prevention of Axis Misalignment by Optic Capture in Pediatric Cataract Surgery

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課博・論博

同　意　書

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論文題目

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記

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Efficacy of Toric Intraocular Lens and Prevention of Axis Misalignment by Optic Capture in Pediatric Cataract Surgery

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Abstract

Purpose: To compare the outcomes of intraocular lens (IOL) implantation using toric (T)-IOL and non-toric (N)-IOL in pediatric cataract patients with astigmatism, and to examine the effect of optic capture (OC) on the axis misalignment (AM) of the T-IOLs.

Setting: Department of Ophthalmology, Kindai University Faculty of Medicine, Osaka, Japan.

Design: Interventional, comparative case study.

Methods: Consecutive pediatric patients implanted with T-IOLs or N-IOLs were retrospectively reviewed. In the T-IOL group, the preoperative and postoperative corrected distance visual acuity (CDVA) and AM were compared in patients with and without OC.

Results: The T-IOL group included 14 eyes of 11 patients, while the N-IOL group included 22 eyes of 15 patients. One year after surgery, the mean ocular cylinder (1.38 ± 0.80 D) was significantly smaller than the average corneal cylinder (3.33 ± 1.24 D) in the T-IOL group ($P = 0.00012$, Wilcoxon signed-rank test). The mean preoperative and 1-year postoperative CDVA (logMAR) were 0.57/0.003 (T-IOL) and 0.71/0.09 (N-IOL), respectively. The AM at 1 week and 1 year after surgery was 2.6° ± 3.7° and 4.4° ± 3.1° for the OC group, and 13.3° ± 8.8° and 18.5° ± 14.8°, for the non-OC group, respectively. The AM was significantly smaller in the OC group than that in non-OC group ($P = 0.009$, Mann-Whitney U test) at postoperative 1 week.

Conclusion: T-IOL implantation is effective in correcting astigmatism in pediatric cataract patients with astigmatism, and the OC technique is likely to achieve lower AM of the T-IOL.

Keywords：pediatric cataract, optic capture, corneal astigmatism, toric intraocular lens

Introduction

Currently, implantation of intraocular lens (IOL) implantation for pediatric cataract patients is widely accepted. However, there are some issues unique to pediatric cataract surgery, such as, postoperative refractive changes with growth,[1-4] incidence of strabismus,[5] and postoperative complications such as high probability of posterior capsule opacification.[1, 2, 6] In addition, severe astigmatism is often observed in eyes with pediatric cataract.[7, 8] Correction of astigmatism by using toric IOL may further help vision development in children who undergo pediatric cataract surgery; however, the use of T-IOL for pediatric cataract has not been commonly performed and has not been well documented thus far.[9-11] This could be owing to the following possible reasons: first, there are much fewer pediatric cataract patients than adult patients; second, it is particularly difficult to precisely examine corneal astigmatism in young patients; third, postoperative astigmatism changes with aging; fourth, the lack of data of large number of patients with long-term follow-up.

One important point when using T-IOL is to stabilize the IOL in the intended axis, as the axis misalignment (AM) of the T-IOLs reduces the magnitude of astigmatic correction in proportion to the degree of AM. Various methods have been addressed to prevent AM, including pre-operative marking and intraoperative identification of the astigmatism axis by intraoperative aberrometry. In addition, to prevent postoperative rotation of T-IOL, it is imperative that the patients rest immediately after surgery because the greatest degree of IOL rotation appears to occur within 1 hour after surgery.[12]

We have been using the optic capture (OC) technique in pediatric cataract surgery to prevent opacification of the visual axis.[13-15] We hypothesized that OC is useful not only for the prevention of visual axis opacification but also for preventing T-IOL rotation, thus reducing the AM. In this study, we investigated the visual outcomes of T-IOL implantation in children with cataracts and astigmatism. Also, we compared the postoperative AM between patients who underwent T-IOL implantation with and without OC.

Methods

A chart review of 94 eyes of 72 consecutive pediatric patients with cataracts who underwent surgery at Kindai University Hospital between March 2011 and October 2018 was conducted. All surgeries were performed by a single surgeon (S.K.). Patients with other ocular diseases or physical or mental disorders that made pre-or post-operative examinations unreliable were excluded. Finally, 36 eyes of 23 patients (21 eyes of 14 boys and 15 eyes of 9 girls) were included. This study was performed in accordance with the tenets of the Declaration of Helsinki. The Institutional Review Board of Kindai University Faculty of Medicine approved this study (# 30-205), and written informed consent was obtained from the guardians of all included patients.

Selection of IOL

For each patient, the IOL power was calculated using the SRK/T formula on the basis of the keratometry and axial length measurement by optical biometry (IOL Master® 500, Carl Zeiss Meditec AG).

The patients were implanted with either T-IOLs (the T-IOL group) or N-IOLs (the N-IOL group). N-IOLs were implanted before March 2012, T-IOL implantation was only initiated after March 2012, and the OC technique was used for T-IOL implantations performed after May 2015. The candidates for T-IOL implantation were those with a reproducible keratometric value of > 1.5 diopters (D) obtained using a corneal tomographer (TMS-5, Tomey Corporation) that uses both Placido and Scheimpflug technology. With regards to the amount and axis of corneal astigmatism, the regular astigmatism component of the Fourier analysis was used to exclude the effects of irregular astigmatism that could not be evaluated with a keratometer. Data were entered into the online calculator provided by the manufacturers. Considering the post-operative age-related shift to against-the-rule astigmatism, under-correction (1.0 – 2.0 D) of with-the-rule astigmatism was intended. We used the online toric calculator produced by manufacturer of implanted T-IOL using the Holladay formula. The AcrySof IQ toric IOL (Alcon Vision LLC, Fort Worth) was used for 10 eyes, and the Tecnis toric IOL (Johnson & Johnson Vision, Inc.) was implanted in 4 eyes (Table 1).

Table 1. Characteristics of the toric and non-toric IOL groups

	Patient No./eye	Gender	Age at surgery (years old)	Preoperative corneal cylinder and axis [a]	Fourier analysis Regular astigmatism [a]	Postoperative corneal cylinder at 1year (D) [b]	Postoperative ocular cylinder at 1year (D) [b]	IOL model	IOL Cylinder at corneal plane (D)	AM at 1 week (degree)	AM at 1 year (degree)
Non-OC group	1/L	Male	6	-1.46 Ax172°	1.40 Ax 88°	−2.13 Ax2°	-0.51Ax172°	SN6AT3	1.03	8	2
	2/L	Male	12	-1.91 Ax 169°	1.92 Ax 78°	-3.50 Ax 168°	-3.48 Ax 148°	ZCT225	1.54	12	30
	3/L	Male	11	-4.79 Ax 6°	4.64 Ax 97°	-5.95 Ax 10°	-1.94 Ax 38°	SN6AT9	4.11	7	10
	4/L	Male	16	-3.09 Ax 20°	2.72 Ax 79°	-2.24 Ax 0°	-2.01 Ax 12°	SN6AT3	1.03	26	32
OC group	5/L	Female	3	-3.01 Ax 176°	1.92 Ax 86°	-1.81 Ax 178°	-0.42 Ax 35°	SN6AT4	1.55	2	3
	6/R	Female	3	-3.17 Ax 169°	2.40 Ax 81°	-2.64 Ax 161°	-1.11 Ax 141°	SN6AT3	1.03	12	10
	6/L	Female	3	-3.11 Ax 7°	2.28 Ax94°	-2.40 Ax 176°	-0.96 Ax 157°	SN6AT3	1.03	0	1
	7/R	Female	6	-4.43 Ax 11°	4.0 Ax 102°	-4.60 Ax 12°	-1.18 Ax 13°	ZCV300	2.06	0	0
	7/L	Female	6	-4.37 Ax 172°	4.02 Ax 83°	-4.93 Ax 171°	-1.60 Ax 161°	ZCV300	2.06	3	5
	8/L	Female	5	-3.27 Ax 3°	2.84 Ax 92°	-2.99 Ax 175°	-1.73 Ax 9°	ZCV150	1.03	2	4
	9/R	Female	12	-3.94 Ax 174°	3.52 Ax 88°	-3.97 Ax 176°	-1.21 Ax 1°	SN6AT4	1.55	2	2
	9/L	Female	12	-3.86 Ax 14°	3.42 Ax 104°	-4.08 Ax 10°	-1.62 Ax 2°	SN6AT4	1.55	0	5
	10/L	Male	6	-3.25 Ax 3°	3.22 Ax 94°	-3.29 Ax 16°	-1.22 Ax 16°	SN6AT3	1.03	0	7
	11/L	Male	5	-3.59 Ax 173°	3.18 Ax 82°	-2.03 Ax10°	-0.36 Ax 26°	SN6AT3	1.03	5	7

Non-OC group: Patients who underwent an IOL implantation without optic capture. OC group: Patients who underwent an IOL implantation with optic capture.

a: Scheimpflug-Placido corneal tomographer, b: Hartmann-Schack/Placido aberrometer, AM: Axis misalignment.

Surgery

Surgery was performed under general anesthesia, with the exception of one 16-year-old patient, whose surgery was conducted under local anesthesia. The IOL implantations were performed through a 2.4-mm width superior sclerocorneal incision in all cases. The sizes of continuous curvilinear capsulorhexis (CCC) of the anterior capsule was 5.5 mm. The lens was aspirated by an irrigation/aspiration tip after CCC of the anterior capsule. In all eyes with T-IOL, a preoperative tomographic map, and a pre-operative photograph that showed the cornea and limbal vessels were used to mark the targeted astigmatism axis intraoperatively, and the T-IOL was aligned to the marks. For surgery with OC, the center of the posterior capsule was punctured by a 25-gauge needle, and a viscoelastic material was injected into the Berger's space, followed by posterior capsule CCC by forceps. The IOL was first implanted in the capsular bag, then the optics of the IOL were placed beneath the posterior capsule, with the exception of the parts of the junction with haptics. The intraoperative and postoperative complications were reviewed from the medical charts.

Corrected Distance Visual Acuity (CDVA)

The CDVA was measured using a Landolt ring at a 5 m distance, and the decimal acuity was converted to logMAR units. Children with a minimum CDVA of 2.0 or better were evaluated in logMAR units, and the pre-and postoperative CDVAs were compared between the T-IOL and N-IOL groups, as well as between the OC and non-OC groups within the T-IOL group.

Astigmatism Correction

Prior to surgery, the T-IOL patients underwent examination of objective refraction with an autokeratometer, and corneal tomography was performed to evaluate the corneal cylinder power and axis for the T-IOL. Postoperative objective refraction was evaluated with a Hartmann-Schack aberrometer (Topcon KR-1W, Topcon Corporation)[16] at approximately 1 week and 1 year postoperatively. This instrument enables assessment of the misalignment of the T-IOLs by showing the axis of the corneal cylinder and that of the internal cylinder derived from the T-IOL. The difference between the corneal flat axis and the steep axis of the internal cylinder was considered as axial misalignment (AM). The postoperative AM in the subjects with T-IOLs between the OC and non-OC groups were compared. The astigmatic correction was evaluated using vector analysis, and a double-angle plot was used to show the postoperative corneal cylinder and postoperative ocular cylinder (Figure 1). The angles of the left eyes were reversed to the y axis symmetry in order to correct for enantiomorphism of the right and left eyes (left-eye corrected).

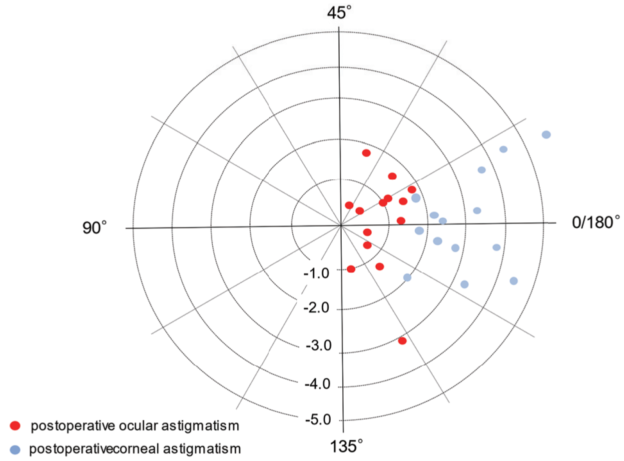

Figure 1. Double-angle vector analysis of corneal and ocular cylinder at postoperative 1 year. Postoperative slit-lamp photographs of a patient who underwent a toric IOL implantation with optic capture.

Statistics

Statistical analyses were performed using a commercial statistical software (Stat Flex version 7, Artech Co. Ltd.). Continuous data are presented as the mean ± standard deviation. Chi-square tests were used to compare proportions, and Mann-Whitney U-test and Wilcoxon signed-rank test were used for quantitative data. P-values < 0.05 were considered statistically significant.

Results

Case Report

A 12-year-old girl was referred to our hospital for surgical treatment of bilateral cataracts. The preoperative astigmatism of her right eye was 3.94 D using the TMS-5. A T-IOL of a corneal plane power of 1.55 D (SN6AT4, Alcon) was implanted in her right eye using the OC technique. The residual cylinder power was -1.25 D (axis 180°) on postoperative day 1, and -1.50 D (axis 180°) at postoperative 15 months (Figure 2). The AM of the T-IOL, calculated from the corneal and internal astigmatism, was 2° at both postoperative 1 day and 15 months. No visual axis opacification was observed at postoperative 15 months, and the uncorrected decimal VA of her right eye was 1.0, with a manifest refraction of -1.5 × 180°.

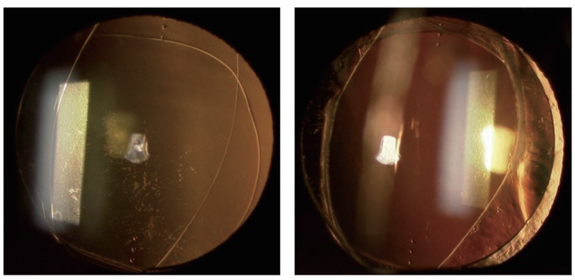

Figure 2. Postoperative slit-lamp photographs of a patient who underwent a toric IOL implantation with optic capture.
(Left) Postoperative 1 day. (Right) Postoperative 15 months: A clear visual axis without rotation of the toric IOL is observed.

Demography

The average age of the patients at the time of surgery was 7.8 ± 3.8 years: 7.7 ± 3.7 years (range, 3 – 13 years) for the N-IOL group, and 8.1 ± 4.1 years (range, 3 – 16 years) for the T-IOL group. There was no significant difference in age between the two groups (P = 0.78253, Mann-Whitney U-test). The average follow-up period was 31.2 ± 27.6 months (range, 9 – 96 months): 35.6 ± 32.0 months (range, 9 – 96 months) for the N-IOL group, and 24.3 ± 17.8 months (range, 9 – 72 months) for the T-IOL group.

The N-IOL group included 22 eyes of 15 patients (15 eyes of 10 boys and 7 eyes of 5 girls), while the T-IOL group included 14 eyes of 11 patients (6 eyes of 6 boys and 8 eyes of 5 girls). Three patients (2 boys and 1 girl) had a T-IOL in one eye and N-IOL in the contralateral eye. No significant difference was observed in the preoperative corneal cylinder power between the T-IOL group (3.3 ± 1.2 D, range, 1.3 – 4.8 D) and N-IOL group (2.5 ± 1.1 D, range, 1.0 – 5.1) (P = 0.081, Mann-Whitney U-test). In the T-IOL group, the mean of postoperative corneal cylinder and ocular cylinder at 1 year were 3.3 ± 1.2 (range, 1.8 – 6.0) D and 1.4 ± 0.8 (range, 0.4 – 3.5) D, respectively. Eleven of the 14 eyes in the T-IOL group, and 20 of the 22 eyes in the N-IOL group were followed-up for more than 1 year postoperatively.

OC was performed in 15 eyes (68.2 %) in the N-IOL group, and in 10 eyes (71.4 %) in the T-IOL group. The average age of the patients at the time of cataract surgery with and without OC was 6.7 ± 3.3 years (range, 3 – 12 years) and 10.5 ± 3.5 years (range, 6 – 13 years), respectively. The T-IOLs used in this study are shown in Table 1. The intraocular pressure was 16.1 ± 3.1 / 13.1 ± 5.0 (range, 11 – 20 mmHg / 3 – 21 mmHg) at 1 day after surgery (T-IOL group / N-IOL group).

Corrected Distance Visual Acuity (CDVA)

Mean of pre-and postoperative 1 year CDVAs for the T-IOL group was 0.57 (range, 0.10 – 2.0) / 0.003 ± 0.8 (range, – 0.08 – 0.15) and N-IOL groups was 0.71 (range, 0 – 1.70) / 0.09 (range, – 0.30 – 1.30). No significant difference was observed in the preoperative (P = 0.435) or postoperative (P = 0.464) CDVAs between the two groups (Mann-Whitney U-test). While a significant difference was observed between the pre-and postoperative 1 year CDVAs in the OC group (P = 0.002, Wilcoxon signed-rank test), no significant difference was found in the non-OC group (P = 0.125, Wilcoxon signed-rank test).

Astigmatism Correction

In the T-IOL group, all eyes had with-the-rule astigmatism, and the average corneal cylinder before surgery was 3.37 ± 0.91 D (range, 1.46 – 4.79 D) using a corneal tomographer. Furthermore, 12 of 14 eyes had a corneal cylinder of 3.0 D or more. At postoperative 1 year in the T-IOL group, the average ocular cylinder (1.38 ± 0.80 D, range, 0.36 – 3.48 D) was significantly smaller than the average corneal cylinder (3.33 ± 1.24 D, range, 1.81 – 5.95 D) with KR-1W (P = 0.00012, Wilcoxon signed-rank test).

In the N-IOL group, 4 eyes of 2 patients had severe astigmatism. However, these eyes were not considered as indication of T-IOL owing to the poor reproducibility of the corneal tomographer in both eyes of one patient or a large component of irregular astigmatism in both eyes of another patient.

Figure 2 shows the vector analysis results for the postoperative ocular cylinder and the postoperative corneal cylinder at 1 year. Vector analysis indicated that the average of the corneal cylinder (3.12 D, axis 179.15 degree) was corrected by the T-IOL, and the mean of the ocular cylinder was 0.90 D, axis 175.4 degree. In addition, the astigmatism correction by the T-IOL was 2.13 D, axis 0.2 degree using the Alpins method. Although only two eyes had corneal cylinder less than 2 D preoperatively, all eyes except one had an ocular cylinder of less than 3 D at postoperative 1 year (Figure 3). The surgically induced astigmatism in all patients was 0.44 ± 0.36 D (range, 0 – 0.88; 30 eyes) at postoperative 1 day to 1 week based on the Alpins method.

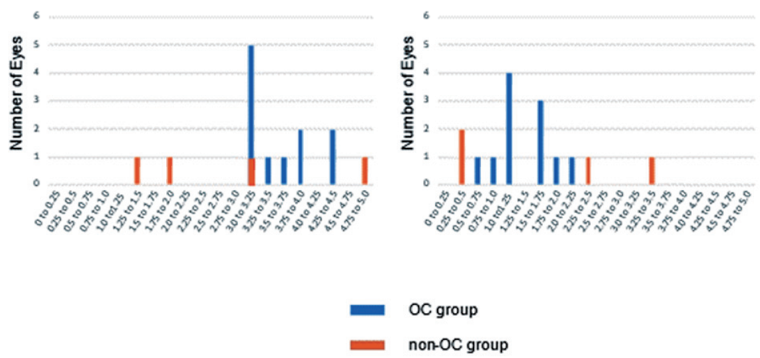

Figure 3. Preoperative (left) and postoperative 1 year (right) distribution of the refractive astigmatism in eyes in which toric IOL was implanted.
Left: Auto-keratorefractometer, right: aberrometer

Axis Misalignment of the T-IOLs

Table 2 indicates the axis misalignment of the T-IOL, with or without optic capture, at postoperative 1 week (7.2 ± 12.9 days) and 1 year (12.9 ± 2.2 months). The OC group had significantly less AM than the non-OC group at postoperative 1 week (P = 0.009, Mann-Whitney U-test). Likewise, the OC group had a significantly smaller change in AM than the non-OC group from postoperative 1 week to postoperative 1 year (P = 0.024, Mann-Whitney U-test).

Intraoperative and Postoperative Complications

During surgery, no herniation of the vitreous into the anterior chamber was observed in any of the eyes. In addition, no postoperative visual axis opacification was observed in eyes with OC (25 eyes with a mean follow-up of 25.4 ± 23.2 months). By contrast, in eyes without OC, postoperative visual axis opacification was observed in 6 of 11 eyes with a mean follow-up of 21.0 ± 6.4 months. No increase in postoperative intraocular pressure (>21 mmHg) was observed in any of the included eyes.

Table 2. Axis misalignment of toric IOL with and without optic capture

		non-OC (n=4)	OC (n=10)	*P*-value [a]
Postoperative 1 week (degree)	mean	13.3 ± 8.8	2.6 ± 3.7	0.00900 *
	range	7-26	0-12	
Postoperative 1 year (degree)	mean	18.5 ± 14.8	4.4 ± 3.1	0.10600
	range	2-32	0-10	
Change of AM (degree)	mean	8.3 ± 6.7	2.2 ± 2.2	0.02400 *
	range	3-18	0-7	

OC: Patients who underwent a toric intraocular lens implantation with optic capture, non-OC: Patients who underwent a toric intraocular lens implantation without optic capture, AM: Axis misalignment, a: Mann-Whitney U test. *Statistically significant.

Discussion

This study demonstrated that T-IOL implantation can achieve effective astigmatic correction in pediatric cataract patients with astigmatism. Moreover, the OC technique is likely to not only maintain a clear visual axis, but also to reduce postoperative AM of the T-IOL. To the best of our knowledge, our study is the first to show the efficacy of OC in reducing AM of the T-IOL in cataract surgery case series.

Previous studies have revealed a high rate of astigmatism (>1 D) in children with congenital cataract in Denmark (52%)[7] and China (79%).[8] Furthermore, in astigmatism-related amblyopia in children, treatment effects primarily occur early in treatment with spectacle correction.[17, 18] Therefore, we considered that correction of severe astigmatism by T-IOL should be effective for improving postoperative visual function in patients with pediatric cataract, and began to use T-IOL in their treatment. As a result, in this study, compared to the N-IOL group, the T-IOL group with severe corneal astigmatism showed comparable postoperative CDVAs to those of N-IOL group. Similar attempts have been reported, where it appeared that they aimed for complete reduction of cylinder power and did not evaluate AM.[9, 10] In our study, in view of the long-term changes in astigmatism, i.e., a significant trend toward against-the-rule astigmatism associated with increasing age of both anterior and total corneal astigmatisms for adults.[19–21] We chose a cylinder power of the T-IOL that would target postoperative with-the-rule astigmatism of 1.0 – 2.0 D, and we evaluated for AM postoperative 1 week and 1year. The exception was in the first four cases, when T-IOL implantation was first initiated in pediatric cataract patients in our institute. Our results showed that the cylinder power in ocular astigmatism at postoperative 1 year was 0.42 – 1.73 D in the OC group in the T-IOL group, which we consider within the range we aimed to achieve (Figure 1). Additionally, none of the patients showed against-the-rule astigmatism by overcorrection.

As most of our patients are young, their eye growth is ongoing. Therefore, we have not attempted any remaining refractive error correction by laser refractive surgery, such as advanced surface ablation, LASIK, or SMILE. However, these techniques could be used in the future once the patient is at least 18 years old and eye growth has stabilized. Another method of correcting postoperative refractive errors is the use of light-adjustable IOL.[22] However, we suppose the long-term stability and safety of the lens have to be well established before its clinical use for children who may live 70 to 80 years or longer postoperatively.

Regarding the effect of OC in pediatric cataract surgery, Gimbel et al.[23] reported that with the OC technique, no postoperative opacification of the visual axis was observed in 18 of 18 eyes with 35.5 ± 9.45 months follow-up. Vasavada et al.[24] also reported that with the OC technique, postoperative opacification of the visual axis was noted in 1 of 8 eyes. In our data, postoperative visual axis opacification was not observed in all 25 eyes in which OC was used, with 25.4 ± 23.2 months follow-up, while, in eyes in which OC was not used, 6 of 11 eyes developed postoperative visual axis opacification. YAG laser capsulotomy can be employed for the postoperative visual axis opacification in eyes without a posterior capsulorhexis. As it can be performed in an outpatient clinic only on relatively older children, posterior capsulorhexis is recommended for relatively younger children. Thus, OC seems to be beneficial in preventing postoperative visual axis opacification.

We performed anterior and posterior capsulorhexis manually by capsule forceps. Although a femtosecond laser could provide more uniform capsulorrhexis,[25, 26] there are limitations to adopting this technique widely, such as the need to obtain a costly laser machine and implement complex surgical procedures and set-up; i.e., the general anesthesia device and the laser machine should be in the same operation room.

The use of a capsular tension ring (CTR) has been attempted to prevent toric IOL rotation. It is technically easier than OC. However, the efficacy of CTR in preventing toric IOL rotation has not been well established, as there have been positive[27] and negative results.[28]

In addition to preventing postoperative visual axis opacification, Vasavada et al.[24] suggested that OC can prevent IOL decentration by locking the IOL haptics by the continuous margin of the posterior capsule. In adult cataract surgery, the reverse OC technique is beneficial in stabilizing T-IOL.[29] In this study, the OC seemed to be effective in reducing AM of the T-IOL, most likely by preventing IOL rotation and stabilizing the IOL postoperatively. This may explain why we observed less AM in the OC group at postoperative 1 week and 1 year. In addition, the change in the AM between postoperative 1 week and 1 year was smaller in the OC group. This result indicates that postoperative rotation of the T-IOL can be effectively prevented using the OC technique.

In the OC and non-OC groups, 12 eyes of 9 patients (10 eyes with OC and 2 eyes without OC) had AM ≤ 15°, and their astigmatism was evaluated. Our results indicated a postoperative improvement in astigmatism in all cases ($P = 0.00012$, Wilcoxon signed-rank test; Figure 2). According to data from previous studies, a deviation of 10° can reduce the correctional effect by approximately one-third.[30, 31] In this study, we measured

AM by the difference of the axis of the flatter internal cylinder (flattest toric IOL meridian) and the axis of corneal cylinder (steeper meridian). Although this method reflects the AM of the T-IOL at the time of measurement, it cannot determine when the AM occurred (i.e., before the first measurement), or the degree of AM at the time of surgery. This is one major limitation of the method used in this study. Other limitations include the small number of patients, differences in preoperative corneal astigmatism between the T-IOL and N-IOL, and a relatively short-term follow up.

We believe that T-IOL implantation combined with the OC technique is an effective treatment option in pediatric cataract surgery in patients with severe astigmatism.

Value Statement

"What Was Known"

- The use of toric IOL has already become a standard of care for adult cataract eyes with severe astigmatism. It effectively reduces ocular aberrations and achieves excellent distance vision.
- The optic capture technique has been used to prevent postoperative visual axis opacity in pediatric cataract surgery, in which posterior capsule is removed as a standard surgical technique.

"What This Paper Adds"

- Toric IOL in pediatric cataract with severe corneal astigmatism is effective in reducing postoperative ocular astigmatism.
- Optic capture technique is useful in preventing axis misalignment of toric IOL.

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