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Original Article

Objective Changes in the Contralateral Eye after Unilateral Cataract Surgery

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Purpose: This study evaluated the objective changes in the contralateral eye after unilateral cataract surgery.

Methods: The study was designed as retrospective observational study. It included 44 patients who underwent unilateral cataract surgery. Collected data were uncorrected and corrected visual acuity, spherical equivalent, intraocular pressure, contrast sensitivity (CS), stereoacuity, and anterior segment optical coherence tomography parameters. Data were collected preoperatively, and 1 week and 1 month postoperatively for each eye.

Results: Following unilateral cataract surgery, the pupil size of the fellow eye decreased from 3.46 mm to 3.17 mm (postoperative week 1, $p = 0.003$) and 3.08 mm (postoperative month 1, $p < 0.001$). Anterior chamber depth of the fellow eye increased significantly from 3.16 mm to 3.27 mm (postoperative week 1, $p = 0.005$) and 3.26 mm (postoperative month 1, $p = 0.001$). Uncorrected distance visual acuity (UDVA) of the fellow eye improved significantly at postoperative week 1 ($p = 0.042$) and postoperative month 1 ($p = 0.044$). Change of UDVA of the fellow eye at postoperative month 1 was significantly correlated with that of the treated eye ($p = 0.039$).

Conclusions: Anterior chamber structures changed and UDVA improved in the contralateral eye after unilateral cataract surgery in our cohort. Because fellow eyes were positively affected by monocular cataract surgery, it would be good information if planning for unilateral cataract surgery due to inevitable reasons.

Key Words: Anterior chamber, Anterior optical coherence tomography, Cataract surgery, Contralateral eye, Pupil size

Cataract is the primary cause of blindness, and almost 18 million people are reported to be blind from cataracts [1]. Cataract extraction is the most frequently performed ocular surgery worldwide [2]. Following cataract surgery, patients report improvements in not only visual function but also real-life activities and emotional and social energy [3].

Through various previous studies, anterior segment structure changes after bulky crystalline lens extraction have been reported. The anterior chamber deepens, the iris constricts more, and the peripheral angle widens. Consequently, intraocular pressure (IOP) decreases after cataract surgery even in nonglaucomatous eyes [4–7]. However, few studies have evaluated changes in the fellow eye.

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Patients who undergo unilateral cataract surgery often report changes (worsening or improvement) in the visual function of the untreated fellow eye. Whether patients' perception of changes after unilateral cataract surgery are simple comparisons between two eyes or actual changes in the anterior segment of the contralateral eye is unclear. Because more light passes through the treated eye, visual acuity improves, so there could be both subjective and objective changes in the fellow eye. Pupil size of the fellow eye might also decrease due to an indirect pupil reflex [8], and the anterior segment structure and optical reflection of the untreated fellow eye could be affected negatively or positively.

Anterior segment changes in the fellow eye after unilateral cataract surgery, particularly changes around the peripheral trabecular meshwork from pupillary constriction, could affect aqueous flow in the contralateral eye. Anterior segment optical coherence tomography (AS-OCT) allows quantitative measurement of anterior chamber and peripheral angle structures [9–11].

Sequential bilateral cataract surgeries can be contraindicated for some patients due to poor general health conditions, cognitive impairments, mood disorders, or socio-economic factors. In these cases, unilateral cataract surgery is preferred for those patients. Additional research on the effects of unilateral cataract surgery on the fellow eye would guide doctors' decision making and counseling of patients and their guardians.

In this study, the authors investigate objective changes in the untreated fellow eye after unilateral cataract surgery including visual function, anterior segment parameters, and IOP.

Materials and Methods

Ethics statement

This study is a retrospective chart review, approved by the Institutional Review Board of Chung-Ang University Hospital (No. 1706-002-16073). The requirement for informed consent was waived due to the retrospective nature of the study. The study adhered to the tenets of the Declaration of Helsinki.

Patient data

Forty-four patients who underwent unilateral cataract surgery between January 2016 and August 2020 by a single surgeon (YSC) and met the inclusion criteria were enrolled. Included eyes had the following characteristics: a baseline Lens Operations Classification System III score [12] for nuclear sclerosis of ≥2 in the treated eye, with an interocular grade difference of at least 2; a preoperative interocular difference in the spherical equivalent (SE) within 2.0 diopters (D), and the refractive power of the fellow eye within ±2.0 D at baseline. Excluded were patients with a

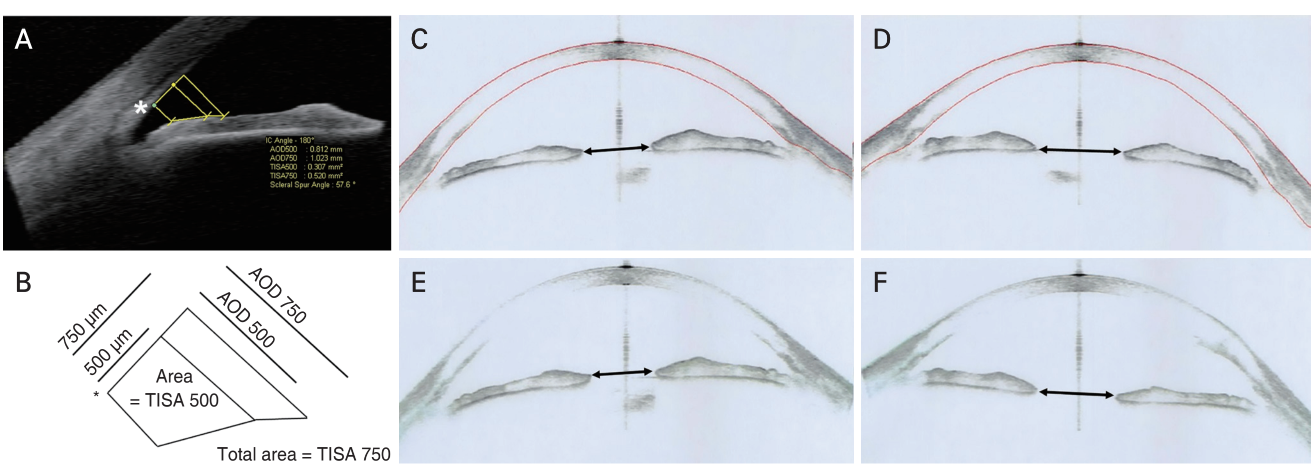

Fig. 1. Anterior segment optical coherence tomography images of a patient. (A, B) A built-in anterior segment optical coherence tomography program automatically measured angle opening distance (AOD) 500, AOD 750, trabecular iris space area (TISA) 500, and TISA 750 using a manual selection of the scleral spur location (asterisk). (C–F) Images of the anterior segment of the fellow eye of one patient. (C) Preoperative images. (E) One month after unilateral cataract surgery. (D, F) Images of the anterior segment of the treated eye of the same patient. In this patient, the pupil size of the fellow eye decreased from 2.18 to 2.06 mm, and the pupil size of the treated eye decreased from 2.81 to 2.56 mm.

history of ocular surgery or ocular trauma for either eye. Any eyes with angle closure, peripheral anterior synechiae, corneal opacity, or iris deformity were also excluded.

Data were collected before surgery and 1 week and 1 month after surgery. Uncorrected distance visual acuity (UDVA), uncorrected near visual acuity, corrected distance visual acuity (CDVA), corrected near visual acuity (CNVA), IOP, contrast sensitivity (CS), stereoacuity, and AS-OCT parameters were measured. These parameters are routinely measured during routine cataract surgery evaluation. For reproducibility and accuracy of the results, the room illumination remained constant during the ocular examinations. All images were taken by the same examiner under identical conditions. For monocular examinations of visual acuity, CS, and AS-OCT, we used a translucent occluder positioned 1.5 cm in front of the untested eye to allow the same amount of light to pass through the shielded and unshielded eyes. IOP was measured by a pneumatic applanation tonometer. For stereopsis, a Titmus Stereo test (Stereo Optical Co) was used. The examination plate was held at the distance of 40 cm while near vision correction and polarizing glasses were applied. For nine serial steps requiring different capacities of stereopsis between 40 and 3,000 seconds, the patient was asked to choose one floating circle at each step. If the patient reported a wrong answer, the least difference in seconds of arc that the patient perceived binocularly was recorded. CS was examined under photopic conditions with distant vision correction, using CSV-1000E (VectorVision). CS results at 3, 6, 12, and 18 cycles per degree were collected under 85 candela (cd)/m^2 of brightness and converted to log unit. AS-OCT parameters were measred by anterior OCT (Visante, Carl Zeiss Meditec) under photopic conditions. Measured data were pupil size, anterior chamber depth (ACD), angle opening distance (AOD), and trabecular iris space area (TISA) (Fig. 1A–1F). ACD was measured as the length of a line drawn from the center of the posterior cornea surface to the anterior surface of the crystalline lens or intraocular lens. AOD and TISA were measured with programmed measuring equipment. AOD 500 and AOD 750 are the lengths of a line (designated as "line A") drawn perpendicular from the iris surface to a point on the posterior cornea 500 or 750 µm, respectively, anterior to the scleral spur. TISA 500 and TISA 750 are measured as the area lateral to "line A" bordered by the posterior cornea, trabecular meshwork, and iris anterior surface [10].

Surgery

All patients underwent phacoemulsification and posterior

Table 1. Demographics of patients enrolled in this study

Variable	Value (n = 44)	*p*-value
Age (yr)	69.59 ± 7.69	-
Sex		-
Male	19 (43.2)	
Female	25 (56.8)	
Treated eye		-
Right	18 (40.9)	
Left	26 (59.1)	
Preoperative CDVA (logMAR)		<0.001*
Treated eye	0.27 ± 0.20	
Fellow eye	0.14 ± 0.14	
Preoperative CNVA (logMAR)		<0.001*
Treated eye	0.38 ± 0.19	
Fellow eye	0.15 ± 0.16	
Preoperative IOP (mmHg)		0.193
Treated eye	15.16 ± 2.81	
Fellow eye	14.63 ± 2.77	
Preoperative SE (D)		0.269
Treated eye	+0.94 ± 1.89	
Fellow eye	+0.59 ± 1.33	
Preoperative cataract grading (LOCS II)		
Nuclear		0.032*
Treated eye	2.52 ± 0.82	
Fellow eye	2.24 ± 0.72	
Cortical		0.110
Treated eye	1.68 ± 0.80	
Fellow eye	1.44 ± 0.82	
Posterior subcapsular		0.664
Treated eye	0.12 ± 0.44	
Fellow eye	0.16 ± 0.55	
Preoperative pupil size (mm)		0.249
Treated eye	3.46 ± 0.70	
Fellow eye	3.59 ± 0.86	

Values are presented as mean ± standard deviation or number (%).
CDVA = corrected distance visual acuity; logMAR = logarithm of the minimum angle of resolution; CNVA = corrected near visual acuity; IOP = intraocular pressure; SE = spherical equivalent; D = diopters; LOCS = Lens Opacity Classification System.
*Statistically significant, $p < 0.05$ (paired *t*-test).

chamber lens implantation by the same surgeon (YSC). The surgery was with a temporal clear cornea incision of 2.75 mm and anesthesia was performed with topical eyedrops. The target SE was within ±0.25 D, and a monofocal-implanted intraocular lens, TECNIS 1-piece ZCB00 (AMO Inc), was inserted. All surgeries were successfully completed with no intraoperative complications.

Statistical analysis

Statistical analyses were performed using IBM SPSS ver. 26.0 (IBM Corp). The mean values are presented as mean ± standard deviation. Paired *t*-test was done for analyzing baseline difference of the surgery eye and the fellow eye. All ocular parameters 1 week and 1 month after surgery were compared with the values of the baseline with paired *t*-test. For further evaluation to find factors affecting the change of UDVA of fellow eye at postoperative month 1, Pearson correlation test was performed. A *p*-value less than 0.05 was considered statistically significant for paired *t*-test and Pearson correlation test.

Results

Patient characteristics

Patient demographic data are shown in Table 1. A total of 44 patients (19 men and 25 women) were included, and the mean age was 69.59 ± 7.69 years old. Baseline CDVA and CNVA for treated eyes were 0.27 ± 0.196 and 0.38 ± 0.193 in logarithm of the minimum angle of resolution (logMAR), respectively, and 0.14 ± 0.141 and 0.15 ± 0.162 logMAR, respectively, for fellow eyes. Baseline CDVA and CNVA were significantly better in fellow eyes (both $p < 0.001$). Baseline nuclear sclerosis grading (an indication of cataract severity) was significantly higher in treated eyes ($p = 0.032$). However, cortical opacity and posterior subcapsular opacity exhibited no significant differences between treated and fellow eyes. Other baseline parameters—IOP, SE, and pupil size—were of no significant differences.

Table 2. Visual acuity, intraocular pressure, and stereopsis in treated and fellow eyes at baseline and at postoperative week 1 and month 1

Variable	Baseline	Postoperative wk 1	Postoperative mon 1	*p*-value	
				Baseline vs. postoperative wk 1	Baseline vs. postoperative mon 1
Visual acuity (logMAR)					
Treated eye					
UDVA	0.35 ± 0.199	0.08 ± 0.096	0.09 ± 0.117	<0.001*	<0.001*
UNVA	0.50 ± 0.263	0.43 ± 0.175	0.53 ± 0.159	0.265	0.205
CDVA	0.27 ± 0.196	0.04 ± 0.071	0.03 ± 0.062	<0.001*	<0.001*
CNVA	0.38 ± 0.193	0.30 ± 0.185	0.33 ± 0.246	0.029*	0.168
Fellow eye					
UDVA	0.25 ± 0.168	0.21 ± 0.138	0.21 ± 0.142	0.042*	0.044*
UNVA	0.32 ± 0.281	0.26 ± 0.322	0.25 ± 0.286	0.258	0.180
CDVA	0.14 ± 0.141	0.12 ± 0.128	0.13 ± 0.139	0.345	0.605
CNVA	0.15 ± 0.162	0.13 ± 0.125	0.13 ± 0.129	0.186	0.349
Intraocular pressure (mmHg)					
Treated eye	15.16 ± 2.81	14.06 ± 3.12	13.41 ± 2.91	0.025*	0.010*
Fellow eye	14.63 ± 2.76	14.03 ± 2.67	14.64 ± 2.62	0.166	0.768
Stereopsis	166.25 ± 214.249	70.43 ± 74.923	70.43 ± 80.080	0.057	0.060

Values are presented as mean ± standard deviation.
logMAR = logarithm of the minimum angle of resolution; UDVA = uncorrected distance visual acuity; UNVA = uncorrected near visual acuity; CDVA = corrected distance visual acuity; CNVA = corrected near visual acuity.
*Statistically significant, $p < 0.05$ (paired *t*-test).

Visual acuity, IOP, stereopsis, and CS

The UDVA of treated eyes improved from 0.35 ± 0.199 logMAR at baseline to 0.08 ± 0.096 logMAR at postoperative week 1 and to 0.09 ± 0.117 logMAR at postoperative month 1 (both $p < 0.001$). The CDVA of treated eyes also significantly improved from 0.27 ± 0.196 logMAR to 0.04 ± 0.071 logMAR at postoperative week 1 and to 0.03 ± 0.062 logMAR at postoperative month 1 (both $p < 0.001$). The UDVA values of fellow eyes were 0.25 ± 0.168 logMAR at baseline, 0.21 ± 0.138 logMAR at postoperative week 1, and 0.21 ± 0.142 logMAR at postoperative month 1.

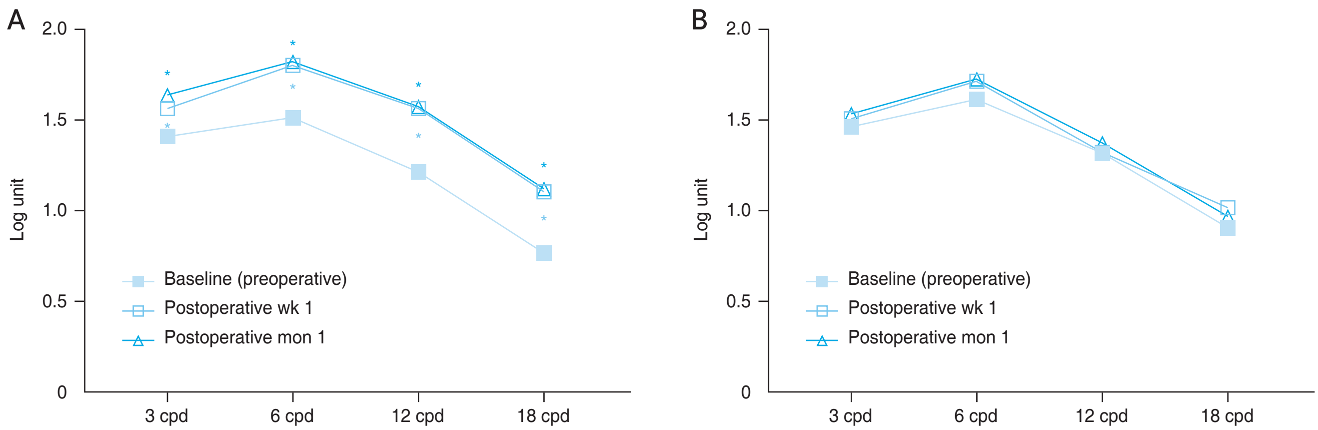

Fig. 2. Contrast sensitivity in (A) the treated eye and (B) the fellow eye. The contrast sensitivity at 3, 6, 12, and 18 cycles per degree (cpd) were analyzed using CSV-1000E (VectorVision). (A) In the treated eye, contrast sensitivity improved significantly at all frequencies at postoperative week 1 and month 1 compared with the results at baseline. (B) In the fellow eye, there was no significant change after cataract surgery. *Statistically significant, $p < 0.05$ (paired *t*-test).

Table 3. Anterior segment optical coherence tomography parameters in treated and fellow eyes at baseline and at postoperative week 1 and month 1

Variable	Baseline	Postoperative wk 1	Postoperative mon 1	*p*-value	
				Baseline vs. postoperative wk 1	Baseline vs. postoperative mon 1
Treated eye					
Pupil size (mm)	3.46 ± 0.64	3.17 ± 0.56	3.08 ± 0.54	<0.001*	0.004*
ACD (mm)	3.16 ± 0.20	3.27 ± 0.20	3.26 ± 0.20	<0.001*	<0.001*
AOD 500 (mm)	0.38 ± 0.18	0.53 ± 0.20	0.53 ± 0.20	<0.001*	<0.001*
AOD 750 (mm)	0.49 ± 0.23	0.75 ± 0.27	0.74 ± 0.29	<0.001*	<0.001*
TISA 500 (mm^2)	0.14 ± 0.07	0.17 ± 0.07	0.19 ± 0.07	0.075*	<0.001*
TISA 750 (mm^2)	0.25 ± 0.12	0.34 ± 0.12	0.35 ± 0.12	<0.001*	<0.001*
Fellow eye					
Pupil size (mm)	3.59 ± 0.86	3.21 ± 0.74	3.14 ± 0.71	0.003*	<0.001*
ACD (mm)	3.12 ± 0.20	3.21 ± 0.29	3.23 ± 0.26	0.005*	0.001*
AOD 500 (mm)	0.34 ± 0.14	0.36 ± 0.16	0.38 ± 0.16	0.558	0.118
AOD 750 (mm)	0.47 ± 0.20	0.49 ± 0.21	0.51 ± 0.23	0.543	0.205
TISA 500 (mm^2)	0.12 ± 0.06	0.13 ± 0.05	0.14 ± 0.06	0.463	0.025*
TISA 750 (mm^2)	0.22 ± 0.10	0.24 ± 0.10	0.25 ± 0.11	0.373	0.130

Values are presented as mean ± standard deviation.
ACD = anterior chamber depth; AOD = angle opening distance; TISA = trabecular iris space area.
*Statistically significant, $p < 0.05$ (paired *t*-test).

Paired *t*-tests revealed marginal significance at postoperative week 1 and month 1 relative to baseline ($p = 0.042$ and $p = 0.044$, respectively). Other visual acuity parameters for fellow eyes showed no statistical differences (Table 2).

The IOP of treated eyes decreased significantly from 15.16 ± 2.81 to 14.06 ± 3.12 mmHg at postoperative week 1 ($p = 0.025$) and to 13.41 ± 2.91 mmHg at postoperative month 1 ($p = 0.010$). IOP of fellow eyes showed no significant changes after surgery (Table 2).

CS of treated eyes showed significant improvement at postoperative week 1 at all four spatial frequencies (Fig. 2A), whereas no significant changes were observed in fellow eyes (Fig. 2B). Stereopsis changed from 166.25 at baseline to 70.43 at postoperative month 1, although the improvement was not significant (Table 2).

Anterior segment parameters

Table 3 shows the results of AS-OCT parameters. In surgery eyes, pupil size, ACD, AOD 500, AOD 750, and TISA 750 revealed statistical changes from postoperative week 1, and TISA 500 reached statistical difference at postoperative month 1. The pupil size decreased while other parameters all increased. In the fellow eyes at postoperative week 1, the pupil size decreased ($p = 0.003$) and ACD deepened ($p = 0.005$); the changes maintained significance until postoperative month 1. Other parameters showed tendencies to increase, except for TISA 500, which showed significant increase at postoperative month 1.

Correlation analysis

A correlation analysis to find factors associated with the change of UDVA of fellow eyes is presented in Table 4. Baseline UDVA of fellow eyes and the change of UDVA of treated eyes showed statistically significant correlations with the change of UDVA of fellow eyes ($p = 0.001$ and $p = 0.039$, respectively).

Discussion

Changes in ocular parameters of the treated eyes after cataract surgery have been previously reported [4–7]. In this study, we focused on the responses of the untreated fellow eye in the first month after unilateral cataract surgery. The data revealed significant reductions in pupil size, deepening of ACD, and improvement of UDVA in the fellow eyes of our cohort. AOD and TISA showed increasing tendencies.

It is important to understand the settings in which the patients were examined. For all routine ocular examinations, we maintained photopic conditions. For monocular examinations of visual acuity, CS, and AS-OCT, we used a translucent occluder positioned 1.5 cm in front of the eye not being assessed to allow the light to enter both eyes equally, so that when the untreated eye was assessed, an enhanced light reflex remained in the treated eye to maintain a contralateral pupil reflex [8]. In this way, we were

Table 4. Correlation between changes in the UDVA of the fellow eye at postoperative month 1 after routine cataract surgery at baseline and other parameters

Variable	r	*p*-value
Age (yr)	–0.181	0.398
Baseline UDVA of fellow eye (logMAR)	–0.648	0.001*
Delta UDVA of surgery eye (logMAR)	0.423	0.039*
Baseline UDVA difference between treated and fellow eyes (logMAR)	0.026	0.904
Delta stereoacuity	–0.034	0.875
Delta pupil size of surgery eye (mm)	0.229	0.306
Delta pupil size of fellow eye (mm)	0.070	0.757
Delta ACD of surgery eye (mm)	0.143	0.526
Delta ACD of fellow eye (mm)	–0.176	0.434
Nuclear cataract grade of fellow eye	–0.400	0.852

UDVA = uncorrected distance visual acuity; logMAR = logarithm of the minimum angle of resolution; ACD = anterior chamber depth.
*Statistically significant, $p < 0.05$ (Pearson correlation test).

able to assess the fellow eye's ocular parameters in a more real-world physiologic condition.

Numerous studies have reported objective changes in treated eyes after cataract surgery. During surgery, an average thickness of 4.4 mm of crystalline lens is replaced with an artificial lens that is typically <1 mm thick [13]; therefore, ACD and anterior chamber volume increase, giving the iris more freedom of movement, which decreases pupil size [5,6]. In addition, removal of opaque media increases light stimulus and strengthens the pupillary reflex in the treated eye [8]. Extraction of the crystalline lens also affects the peripheral angle, and studies report increases in AOD [7] and peripheral angle degree [4] in non-glaucomatous open-angle eyes after cataract surgery. IOP becomes lower in treated eyes after cataract surgery due to less crowding at the peripheral angle and increased aqueous humor outflow [7,14]. Our results are consistent with previous studies: treated eyes had decreases in pupil size and IOP and increases in ACD, AOD 500, AOD 750, TISA 500, and TISA 750 at postoperative week 1 and month 1.

More light stimulus in the treated eye affects pupil size in the fellow eye through indirect pupillary reflex. Light stimulus entering the optic nerve (cranial nerve II, CN II) is passed to the pretectal nucleus, and crossed and uncrossed nerve fibers are passed to the ipsilateral and contralateral Edinger-Westphal nuclei of the midbrain. Signals are then transmitted to postganglionic nerve fibers that exit with CN III and constrict the ipsilateral and contralateral iris muscles [8]. Because light signal input increases in the treated eye after cataract extraction, the indirect pupil reflex of the fellow eye also increases. In our study, pupil size in the fellow eye was significantly smaller at postoperative week 1 and month 1. Narrower light entry improves visual acuity by deepening the depth of focus [15] and reducing peripheral aberration [16]. On the other hand, smaller pupils can decrease light stimuli to the retina, causing vision to deteriorate. However, in our study, the UDVA of the fellow eye improved significantly at postoperative week 1 and month 1. In a previous study that analyzes the effects of pinhole glasses in patients with no ocular disease (mean age of 35.5 years), UDVA significantly improved from 0.44 ± 0.46 to 0.19 ± 0.25 ($p < 0.001$) after pinhole glass application [15]. Likewise, if media opacities are minimal, pinholes can improve distance visual acuity. In our cohort, cataract grading of the fellow eye was mild (mean nuclear sclerosis, 2.24; cortical opacity, 1.44; posterior supcapsular opacity, 0.16) with a favorable baseline CDVA of 0.14 logMAR. In patients with mild media opacity, smaller pupil size positively affects visual function in the fellow eye by enhancing the depth of focus. On the other hand, for near targets, the near accommodative reflex, which passes through a different midbrain nucleus than the light reflex, controls iris constriction [17], so the effect of indirect light reflex might be less obvious when aiming at a near target.

No significant changes in the CS of fellow eyes were observed. Smaller pupils may reduce CS by diffraction and decreasing the degree of light stimulus [18]. On the other hand, larger pupil size can hinder CS by larger aberration [18]. One study reported that aperture sizes larger than 2.0 mm caused no diffraction-related problems of CS [19]. In our study, the mean postoperative pupil diameters of fellow eyes were 3.21 ± 0.74 mm at postoperative week 1 and 3.14 ± 0.71 mm at postoperative month 1, which is likely not small enough to cause CS impairment. These data represent an affirmative result that there was no change in CS, even when pupil size decreases.

We hypothesized that stimulating iris contraction in the fellow eye might affect structures around the peripheral angle in the same manner as topical miotics work. Our results revealed that ACD, AOD, and TISA tended to increase, but the increases failed to reach statistical significance, probably hindered by bulky crystalline lens of the fellow eye. It has been reported that 2% pilocarpine, a cholinergic agent used for angle closure glaucoma, reduced pupil diameters from 2.96 ± 1.04 to 2.38 ± 1.11 mm (a 19.6% reduction) in normal populations [20]. In our cohort, pupil diameter decreased from 3.59 ± 0.86 to 3.14 ± 0.71 mm (a 12.5% reduction) at postoperative month 1. Therefore, although the pupil constriction effect on the fellow eye was not significant, it had a positive effect of widening the surround angle.

In Table 4, we tried to identify factors that affect visual acuity improvements in untreated fellow eyes. The change of UDVA of fellow eyes at postoperative month 1 was positively correlated with the change of UDVA of treated eyes. Although not fully understood, there is a possibility that improved visual function of the treated eye might affect cognitive ability by enhancing visual stimulus. Cognitive improvements in the elderly after cataract surgery have been reported in previous studies [21–23]. One study performed magnetic resonance imaging with glaucoma patients and reported that long-term visual deprivation due to retinal damage reduced grey matter volume in the visual cortex [24]. In contrast, grey matter volume in the visual cortex increased after unilateral cataract surgery in middle-aged and elderly patients, suggesting brain plasticity [25]. The authors suggested that improved visual parity between bilateral eyes after unilateral cataract surgery may facilitate stereopsis and binocular fusion, thereby increasing the amount of grey matter in the visual cortex. Although the evidence is indirect, brain plasticity after cataract surgery might affect visual function in the fellow eye after cataract surgery.

For patients whose physical or mental conditions contraindicate sequential bilateral cataract surgery, our study suggests two ideas. First, unilateral cataract surgery can favorably impact the visual acuity of an untreated eye with a mild cataract and similar SE from pinhole effects and brain plasticity. Second, when both eyes have narrow angles, the peripheral angle in the untreated eye may widen, and reduce the risk of intermittent angle closure of the fellow eye. This study suggests reasons to not rush a second eye operation in patients with poor conditions. This suggestion is consistent with a previous study on the impact of bilateral or unilateral cataract surgery on subjective visual functioning. The authors concluded that patients benefit more from bilateral cataract surgery than unilateral cataract surgery only when the fellow eye has a severe cataract or poor visual acuity [26].

To our knowledge, this is the first study to focus on changes of the untreated eye after monocular cataract surgery. It is necessary to understand that positive visual changes from structural differences in the contralateral eye could occur after unilateral cataract surgery. This information is expected to helpful when unilateral cataract surgery is planned for various reasons.

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