

The Outcomes of Cataract Surgery in Small and Normal Pupillary Eyes with Pseudoexfoliation

Psödoeksfoliyasyonu Olan Küçük ve Normal Pupillalı Gözlerde Katarakt Cerrahisi Sonuçlarımız

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ABSTRACT

Introduction: To evaluate the outcomes of cataract surgery and anterior chamber parameters in pseudoexfoliation cases in our clinic.

Methods: The patients, who were admitted to our clinic between 01.03.2016 and 01.04.2019 and who were found to have cataract and pseudoexfoliation in the examination, were divided into two groups according to dilated pupillary diameter above and below 5 mm before cataract surgery. Preoperative and postoperative visual acuities, intraocular pressure levels, anterior chamber depths and perioperative posterior capsule opening, development of floppy iris syndrome and corneoscleral suture rates were evaluated.

Results: Sixty eyes of 60 patients, including 31 male (51.7%) and 29 female (48.3%) patients, with a mean age of 70.2±7.1 (range: 57-82) years, were included. Patients with pupillary diameter above 5 mm were included in group 1, and those below 5 mm were included in group 2. Preoperative and postoperative visual acuity according to Snellen chart, intraocular pressure and anterior chamber depths of patients in group 1 were 0.2±0.1 (range: 0.1-0.4) vs 0.6±0.2 (range: 0.2-1.0), 16.9±1.7 (range: 14-20) mmHg vs 15.2±1.2 (range: 12-17) mmHg, and 3.04±0.31 (range: 2.29-3.73) mm vs 3.81±0.38 (range: 2.48-4.36) mm, respectively. Preoperative and postoperative visual acuity according to Snellen chart, intraocular pressure and anterior chamber depths of patients in group 2 were 0.1±0.1 (range: 0.1-0.4) vs 0.7±0.2 (range: 0.3-1.0), 17.1±1.5 (range: 14-20) mmHg vs 16±1.5 (range: 12-19) mmHg, and 2.98±0.44 (range: 1.98-3.88) mm vs 3.99±0.54 (range: 3.29-5.46) mm, respectively. In group 1, three eyes (10%) had floppy iris syndrome, four eyes (13.3%) had posterior capsule rupture, and corneoscleral suture was performed in three eyes (10%). In group 2, one eye (3.3%) had floppy iris syndrome, one eye (3.3%) had posterior capsule rupture and corneoscleral suture was performed in one eye (3.3%). There was no statistically significant difference between two groups in terms of age, gender, development of floppy iris syndrome, posterior capsule rupture, corneoscleral suturing, preoperative

ÖZ

Amaç: Kliniğimizde psödoeksfoliyasyonlu olgulara uygulanan katarakt cerrahisi sonuçlarını ve ön kamara parametre değerlerini değerlendirmektir.

Yöntemler: 01.03.2016 ve 01.04.2019 tarihleri arasında kliniğimize başvuran, yapılan muayenede katarakt ve psödoeksfoliyasyon saptanan olgular katarakt ameliyatı öncesi dilate pupilla çapına göre 5 mm'nin üzerinde ve altında olmak üzere iki gruba ayrıldı. Olguların ameliyat öncesi ve sonrası görme keskinlikleri, göz içi basıncı seviyeleri, ön kamara derinlikleri ile ameliyat esnasında arka kapsül açılması, gevşek iris sendromu gelişimi ve korneaskleral sütür atılması oranları değerlendirilmiştir.

Bulgular: Yaş ortalamaları 70,2±7,1 (57-82) olan, 31'i erkek (%51,7), 29'u kadın (%48,3) olmak üzere 60 hastanın 60 gözü dahil edildi. Pupilla çapı 5 mm'nin üzerinde olanlar grup 1'e, 5 mm'nin altında olanlar grup 2'ye dahil edildi. Grup 1'deki hastaların ameliyat öncesi ve sonrası Snellen eşeline göre görme keskinliği, göz içi basıncı ve ön kamara derinlikleri sırasıyla 0,2±0,1 (0,1-0,4), 0,6±0,2 (0,2-1,0); 16,9±1,7 (14-20) mmHg, 15,2±1,2 (12-17) mmHg; 3,04±0,31 (2,29-3,73) mm, 3,81±0,38 (2,48-4,36) mm olarak tespit edildi. Grup 2'deki hastaların ameliyat öncesi ve sonrası Snellen eşeline göre görme keskinliği, göz içi basıncı ve ön kamara derinlikleri sırasıyla 0,1±0,1 (0,1-0,4), 0,7±0,2 (0,3-1,0); 17,1±1,5 (14-20) mmHg, 16±1,5 (12-19) mmHg; 2,97±0,44 (1,98-3,88) mm, 3,99±0,54 (3,29-5,46) mm olarak tespit edildi. Grup 1'deki 3 (%10) gözde gevşek iris sendromu, 4 (%13,3) gözde arka kapsül yırtığı gelişmiş ve 3 (%10) göze korneaskleral sütür konmuştur. Grup 2'deki 1 (%3,3) gözde gevşek iris sendromu, 1 (%3,3) gözde arka kapsül yırtığı gelişmiş ve 1 (%3,3) göze korneaskleral sütür konmuştur. Her iki grup arasında yaş, cinsiyet, gevşek iris sendromu gelişimi, arka kapsül yırtılması, korneaskleral sütür konulması; ameliyat öncesi ve sonrası görme keskinliği, göz içi basıncı ve ön kamara derinlikleri arasında istatistiksel seviyede anlamlı fark bulunmamıştır (sırasıyla; p=0,304, erkek



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and postoperative visual acuity, intraocular pressure and anterior chamber depths ($p=0.304$, $p=0.508$ for male, $p=0.509$ for female, $p=0.500$, $p=0.447$, $p=0.500$, $p=0.304$, $p=0.904$, $p=0.644$, $p=0.025$, $p=0.437$, $p=0.150$, respectively).

Conclusion: Pseudoexfoliation is more likely to occur with small pupils. Both conditions involve an increased risk of complications during cataract surgery.

Keywords: Pseudoexfoliation, cataract, small pupil

için $p=0,508$, kadın için $p=0,509$, $p=0,500$, $p=0,447$, $p=0,500$, $p=0,304$, $p=0,904$, $p=0,644$, $p=0,025$, $p=0,437$, $p=0,150$).

Sonuç: Psödoeksfolyasyonlu olgularda küçük pupilla ile karşılaşma ihtimali daha fazladır. Her iki durum katarakt ameliyat esnasında artmış komplikasyon riskini barındırır.

Anahtar Kelimeler: Psödoeksfolyasyon, katarakt, küçük pupil

Introduction

Pseudoexfoliation is a gray-white, fibrogranular material that accumulates in the anterior lens surface, pupillary edge, iris and angle in the eye, and in the walls of vessels and tissues in the body (1-3).

An area where pseudoexfoliation accumulates in the eye is the corneal endothelial region. The pseudoexfoliation material deposited in this region causes alterations firstly in the functions of corneal endothelial cells, and changes the shape and number in later periods (4). In addition, pseudoexfoliation material deposited on the surface of the cornea may cause corneal curvature changes in cases with increased intraocular pressure (5). The other accumulation area of exfoliative material in the eye is the anterior chamber angle and lens zonules (4,6,7). The material deposited at the anterior chamber angle can cause resistance to the passage of the aqueous humor to the trabecular network, causing open-angle glaucoma (8). Exfoliative material accumulated in the zonules may damage the lens zonules and cause the development of zonular weakness (9). This situation may cause many complications such as loss of zonules, development of aphakia and loss of vitreous in cataract surgery (10,11). In the event that exfoliative material accumulates in the iris, pupillary dilatation occurs less during surgery and an increase in the complications of cataract surgery can be observed (12,13). Another site of pseudoexfoliation in the eye is the lens anterior capsule (14).

The primary accumulation of pseudoexfoliation material outside the eye is the arterial vessel walls. As a result of this accumulation, the probability of cardiovascular and cerebrovascular diseases increases (15,16).

Methods

Ethics committee approval was obtained from Pamukkale University Faculty of Medicine Medical Ethics Committee (decision no: 05, date: 05.03.2019). The study was conducted in accordance with the Declaration of Helsinki. Written and oral consent was obtained from the patients included in the study and their data were evaluated within the scope of the study.

Patients who presented to our ophthalmology outpatient clinic with low vision complaints between 01.03.2016 and 01.04.2019 and in whom the cause of vision loss was due to cataract were included in our study. Age, gender, preoperative maximum dilated pupillary diameters, preoperative and postoperative visual acuities, anterior chamber depths and intraocular pressures were recorded. Patients with eye disease other than pseudoexfoliation and cataract, patients with zonular dialysis, and

patients with previous ocular trauma and surgery were not included in the study.

Anterior chamber depth measurements were performed before and one month after the surgery with the A-Scan ultrasonography under dim light when the pupil was in its natural state. Dilated pupillary measurements of all patients before and one month after the surgery with biomicroscope following 30 minutes after instillation with one drop of tropicamide (Tropamid 1%, Bilim), cyclopentolate hydrochloride (Cycloplegine 1%, Abdi İbrahim) and phenylephrine hydrochloride (Mydfrin 2.5%, Alcon) at intervals of 10 minutes. Visual acuity and intraocular pressure levels of all patients were measured before and one month after the surgery. Visual acuity level was recorded according to Snellen chart and intraocular pressure level was recorded according to applanation tonometer. All eyes were operated by the same surgeon with experience of over 1000 phacoemulsification surgeries with the same microscope, instruments and surgical instruments. As a surgical method, divide and eat method was used for the nucleus removal in all eyes. In the cases whose posterior capsule integrity was impaired during surgery, vitreous viscoelastic material was removed and the remaining nucleus and cortex were removed by aspiration. In these cases, a 3-part lens was implanted in the sulcus. At the end of the operation, corneoscleral sutures with 10/0 nylon sutures were placed in the patients with posterior capsule opening in the area near the main entrance. The side inlets were inflated with balanced salt solution and the operation was terminated.

Patients were divided into two groups as maximum pupillary dilatation diameter of above or below 5 mm. Preoperative and postoperative anterior chamber depths, visual acuity levels and intraocular pressures and intraoperative complications of the eyes in both groups were recorded.

Statistical Analysis

Statistical analysis was performed using SPSS 25.00 for Windows (SPSS Inc., Chicago, Illinois, USA) software using a paired t-test. Descriptive statistics were given as numbers and percentages for categorical variables. Pearson tests were performed for normally-distributed variables and Spearman tests were used for non-normally-distributed variables. $P<0.005$ was considered statistically significant.

Results

Sixty eyes of 60 patients, including 31 male (51.7%) and 29 female (48.3%) patients, with a mean age of 70.2 ± 7.1 (range: 57-82) years, were

included. Nineteen (31.7%) patients had hypertension. There was no history of diabetes mellitus and alpha-blocker drug use in the patients included in the study. Patients with pupillary diameter above 5 mm were included in group 1, and those below 5 mm were included in group 2. The reference pupillary diameters for grouping were made according to the narrow and normal pupillary width specified in the referenced studies (17-19). Group 1 included 30 eyes of 30 patients, 15 men (50%) and 15 women (50%), with a mean age of 69.3±6.9 (range: 58-82) years and group 2 included 30 eyes of 30 patients, 16 men (53.3%) and 14 women (46.7%), with a mean age of 71.2±7.2 (range: 57-79) years. There was no statistically significant difference between two groups in terms of mean age, gender, hypertension, development of floppy iris syndrome, complications, corneoscleral suturing, preoperative and postoperative visual acuity, intraocular pressure and anterior chamber depths (p=0.304, p=0.508 for male, p=0.509 for female, p=0.478, p=0.500, p=0.447, p=0.500, p=0.304, p=0.904, p=0.644, p=0.025, p=0.437, p=0.150, respectively) (Table 1).

Visual acuity, intraocular pressure and anterior chamber depths were evaluated in both groups before and after surgery. Visual acuity and anterior chamber depth were significantly increased in both groups (p=0.000 and p=0.000 for group 1 and p=0.000 and p=0.000 for

group 2, respectively), and intraocular pressure decreased significantly (p=0.000 for group 1 and p=0.013 for group 2) (Table 2).

Floppy iris syndrome developed in three eyes (10%) in group 1 and in one eye (3.3%) in group 2. Posterior capsule integrity was observed to be impaired in four eyes (13.3%) in group 1 and in one eye (3.3%) in group 2. In these five eyes, the nucleus material was not dislocated to the vitreous and the intraocular lens was implanted into the sulcus. Regarding eyes with impaired posterior capsule integrity, corneoscleral sutures were placed in three eyes in group 1 and in one eye in group 2. No statistically significant difference was found between two groups regarding the development of floppy iris syndrome and complications and corneoscleral suturing (p=0.500, p=0.447, p=0.500, respectively).

Discussion

Cataract surgery is a necessary method to increase vision in patients with low vision due to cataract (20,21). In pseudoexfoliation cases, cataract causes a decrease in vision and surgical intervention is necessary to increase vision (22,23). Many studies have shown that pupillary dilatation in eyes with pseudoexfoliation is insufficient (24,25). In our study, 30 eyes with preoperative insufficient pupillary dilatation were evaluated. It has also been reported in many studies

Table 1. The mean values of group 1 and group 2 characteristics evaluated in the study and the statistical evaluation results of the differences between these two groups

	Group 1 (n=30)	Group 2 (n=30)	p
Age, years (range)	69.3±6.9 (58-82)	71.2±7.2 (57-79)	0.304
Gender (%)			
	15 Male (50%)	16 Male (53.3%)	Male=0.508
	15 Female (50%)	14 Female (46.7%)	Female=0.509
Hypertension (%)	6 (20%)	13 (43.3%)	0.478
Floppy iris syndrome (%)	3 (10%)	1 (3.3%)	0.500
Posterior capsule rupture (%)	4 (13.3%)	1 (3.3%)	0.447
Corneoscleral suturing (%)	3 (10%)	1 (3.3%)	0.500
Preoperative VA (range)	0.2±0.1 (0.1-0.4)	0.1±0.1 (0.1-0.4)	0.304
Postoperative VA (range)	0.6±0.2 (0.2-1.0)	0.7±0.2 (0.3-1.0)	0.904
Preoperative IOP, mmHg (range)	16.9±1.7 (14-20)	17.1±1.5 (14-20)	0.644
Postoperative IOP, mmHg (range)	15.2±1.2 (12-17)	16±1.5 (12-19)	0.025
Preoperative ACD, mm (range)	3.04±0.31 (2.29-3.73)	2.97±0.44 (1.98-3.88)	0.437
Postoperative ACD, mm (range)	3.81±0.38 (2.48-4.36)	3.99±0.54 (3.29-5.46)	0.150

*p<0.005. VA: visual acuity (Snellen chart), IOP: intraocular pressure, ACD: anterior chamber depth

Table 2. Preoperative and postoperative evaluation of eyes in group 1 and group 2 and the results of statistical evaluation of the difference between these values

	Preoperative	Postoperative	p	
Group 1	VA (range)	0.2±0.1 (0.1-0.4)	0.6±0.2 (0.2-1.0)	0.000
	IOP, mmHg (range)	16.9±1.7 (14-20)	15.2±1.2 (12-17)	0.000
	ACD, mm (range)	3.04±0.31 (2.29-3.73)	3.81±0.38 (2.48-4.36)	0.000
Group 2	VA (range)	0.1±0.1 (0.1-0.4)	0.7±0.2 (0.3-1.0)	0.000
	IOP, mmHg (range)	17.1±1.5 (14-20)	16±1.5 (12-19)	0.013
	ACD, mm (range)	2.97±0.44 (1.98-3.88)	3.99±0.54 (3.29-5.46)	0.000

*p<0.005. VA: visual acuity (Snellen chart), IOP: intraocular pressure, ACD: anterior chamber depth

that the complications that can be observed in cataract surgery may increase in eyes with pseudoexfoliation. The reason for the increase in complications was reported to be insufficient pupillary dilatation and accompanying zonular damage to pseudoexfoliation (12,26). It has also been shown in some studies that the use of capsular tension ring and iris hook during cataract surgery is higher in these eyes than in normal eyes (27-29).

The rate of deterioration of posterior capsule integrity during cataract surgery in the general population was reported as 1.9% by Chakrabarti and Singh (30), as 0.68 by Chen et al. (31) and as 7.9% by Zare et al. (32). In our study, posterior capsule integrity was impaired during surgery in five eyes, including four eyes in group 1 and one eye in group 2. Thanigasalam et al. (33) reported that the incidence of posterior capsule rupture in eyes with pseudoexfoliation was 2.833 times higher than normal eyes. The incidence of posterior capsule rupture observed in our study was found to be 8.3%. This result seems to be compatible with the results of other studies. In studies evaluating populations that did not use any medication and had no additional disease, the rate of development of floppy iris syndrome was reported as 0.018% by Goyal et al. (34) and as 1.18% by Özer et al. (35). The rate of development of floppy iris syndrome in general populations was stated as 9.09% by Kaczmarek et al. (36) and as 4.1% by Neff et al. (37). Tzamalīs et al. (38) reported the rate of development of floppy iris syndrome in the general population as 1.29% in women and 5.17% in men. In the literature, there is no study on the rate of development of floppy iris syndrome in patients with pseudoexfoliation. In our study, this rate was found to be 6.6%. This rate was found to be higher than that of Goyal et al. (34), Özer et al. (35), Neff et al. (37), and Tzamalīs et al. (38)

Increased visual acuity after cataract surgery has been shown in many studies (39-41). In our study, the postoperative visual acuity level was found to be significantly increased compared to the preoperative visual acuity level. Various studies have shown that postoperative intraocular pressure is lower than preoperative values after cataract surgery (42-44). In our study, intraocular pressure values measured postoperatively were found to be statistically lower than preoperative intraocular pressure values. Several studies have shown that anterior chamber depth is increased after cataract surgery in eyes with and without pseudoexfoliation (45-48). In our study, anterior chamber depth was increased after cataract surgery similar to other studies.

Conclusion

There is an increased risk of complications in cataract surgeries in eyes with pseudoexfoliation. Increased surgical risk in cases where pupillary dilatation is insufficient has been shown to increase in many studies, but this risk increase can be reduced by increasing surgical experience.

Ethics Committee Approval: Ethics committee approval was obtained from Pamukkale University Faculty of Medicine Medical Ethics Committee (decision no: 05, date: 05.03.2019).

Informed Consent: Written and oral consent was obtained from the patients included in the study.

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