The Postoperative Determination of Accompanying Retinal Pathologies in Advanced Cataract Cases where the Fundus cannot be Visualised Preoperatively

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ABSTRACT

Aim: To evaluate retinal pathologies postoperatively in cases with advanced cataract where fundus cannot be visualised.

Material and Method: A retrospective examination was made of patients whom the fundus could not be evaluated preoperatively because of advanced cataract, who underwent cataract surgery and had a normal B-scan ultrasonography examination between September 2020 and December 2023. The demographic data and systemic diseases of the patients were recorded. A detailed ophthalmological examination was performed, including fundus examination, and macular optic coherence tomography scans were obtained preoperatively and within 1 month postoperatively. Retinal pathologies in the eye with advanced cataract were identified and potential risk factors were evaluated.

Results: Evaluations were made of 280 eyes of 280 patients; 141 (50.4%) females and 139 (49.6%) males with mean age of 69.09±9.84 years. Retinal pathologies were determined postoperatively in 82 (29.3%) patients, most frequently dry type AMD (n=27, 9.6%), diabetic retinopathy (n=15, 5.4%) and epiretinal membrane (n=13, 4.6%). In 69 (84.1%) of the cases determined with pathology, the same pathology was determined in the fellow eye. Retinal pathologies were seen more in patients of advanced age and in those who were diabetic (p:0.002, p:0.017, respectively). The presence of pathology in the fellow eye was determined to be a significant risk factor (p<0.001).

Conclusion: Approximately one-third of the cases with advanced cataracts in which the preoperative fundus cannot be visualised are accompanied by retinal pathologies. Advanced age, diabetes, and retinal pathology in the fellow eye were found to be significant risk factors.

Keywords: Cataract, Cataract surgery, Fundus examination, Retinopathy

INTRODUCTION

Cataract renders a transparent lens opaque with dehydration and the compression of lens fibres over time (1). Treatment is surgery and the surgical success rates are extremely high. However, despite surgical success, accompanying retinal pathologies can decrease visual acuity. Patients must be informed on this subject and each patient should undergo a preoperative biomicroscopic fundus examination for decisions to be made about the type of surgery, timing, frequency of postoperativee follow-up, and when necessary, additional treatments. However, in cases with mature, intumescent, or dense posterior subcapsular cataract, the fundus cannot be clearly visualised. In these conditions, only major posterior segment pathologies (retina detachment, vitreous hemorrhage, posterior staphyloma, intraocular mass) can be determined with the use of B-Scan ultrasonography (2, 3). A more detailed evaluation can only be made after cataract surgery. Therefore, early fundus examination in the postoperative follow-up period must not be neglected in these types of patients.

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The aim of this study was to determine accompanying retinal pathologies postoperatively in cataract cases where the fundus could not be distinguished in the preoperative biomocroscopic examination and to identify potential risk factors.

MATERIALS AND METHODS

Approval for this study was granted by the Ethics Committee of Firat University (decision no: 2024/03-47) and all procedures were in compliance with the principles of the Helsinki Declaration. As the study was retrospective, written informed consent was not required. A retrospective examination was made of the files of 1078 patients who underwent cataract surgery in the Ophthalmology Clinic of Elazığ Fethi Sekin City Hospital between September 2020 and December 2023. The study included 280 eyes of 280 patients in whom the fundus could not be distinguished in the preoperative biomicroscopic examination because of advanced cataract and for whom OCT scans could not be obtained.

All the patients underwent a preoperative detailed ophthalmological examination. Best-corrected visual acuity (BCVA) was examined with a Snellen chart, and intra-ocular pressure (IOP) was measured with Goldmann applanation tonometry. After dilatation, the cataract type was determined and fundus examination was performed. Spectral domain macular OCT (OCT HS100, Canon, Australia) was taken. The fundus could not be clearly distinguished in the biomicroscopic examination and OCT images could not be obtained in any of the cases. Demographic characteristics and systemic diseases (hypertension, dabetes mellitus, coronary artery disease) of the patients were recorded. Systemic diseases were determined based on the patient anamnesis and examination of the hospital records.

Patients were excluded from the study if they had a history of intra-ocular surgery or eye trauma, a history of known retinal disease, or if pathology was determined on B-Scan ultrasonography. As it was evaluated whether or not there was pathology in the fellow eyes of eyes postoperatively determined with retinal pathology, in cases with bilateral cataracts, surgery was performed on one eye first and that eye was not included in the study, and the second eye that was operated on subsequently was included.Within 1 month postoperatively at the latest, all the patients underwent biomicroscopic fundus examination and macular OCT images were obtained at the same time.

Statistical Analysis

Data obtained in the study were analyzed statistically using SPSS vn.22.0 software (IBM Corp., Armonk, New York, USA). Descriptive statistics were stated as number (n) and percentage (%) for categorical variables and as mean and standard deviation (SD) values for continuous variables. The Chi-square test was used in the analysis of categorical data. The conformity of continuous variables to normal distribution was assessed with the Kolmogorov-Smirnov test, and as distribution was not observed to be normal, the Mann Whitney U-test was used in analyses. A value of $p<0.05$ was accepted as the level of statistical significance.

RESULTS

Evaluations were made of 280 eyes of 280 patients comprising 141 (50.4%) females and 139 (49.6%) males with a mean age of 69.09±9.84 years. Hypertension was present in 119 (42.5%) patients, diabetes in 72 (25.7%), and coronary artery disease in 28 (10%). The cataract was determined to be mature in 196 (70%) cases, dense posterior subcapsular in 59 (21.%), and intumescent in 25 (8.9%). In the postoperative examination, retinal pathology was determined in 82 (29.3%) cases. The pathologies most frequently seen were dry type AMD in 27 (9.6%) cases, diabetic retinoapthy in 15 (5.4%) (non-proliferative:12, proliferative: 3), and epiretinal membrane in 13 (4.6%). All the pathologies determined are shown in Table 1.

The relationships of retinal pathologies with potential risk factors are shown in Table 2. The probability of the presence of retinal pathology in diabetic cases and those of advanced age was determined to be statistically significantly high (p:0.017, p:0.002, respectively). In 69 (84.1%) of the cases determined with pathology, the same pathology was determined in the fellow eye, and the presence of pathology in the fellow eye was determined to be a significant risk factor ($p<0.001$).

Table 1. *Retinal pathologies determined postoperatively*	
Retinal pathologies	**Number of patients (%)**
Dry type AMD	27 (9.6)
Diabetic retinopathy	15 (5.4)
Epiretinal membrane	13 (4.6)
Vitreomacular traction	5 (1.8)
Retina outer segment defect	5 (1.8)
Degenerative myopia	4 (1.4)
Macular scar	4 (1.4)
Vein branch obstruction	4 (1.4)
Lamellar hole	3 (1.1)
Central serous chorioretinopathy (acute)	2 (0.7)

Table 2. *The presence of retinal pathology associated with other variables*			
Variables	**Retinal Pathology**		**P value**
	Yes	**No**	
Age (years) (mean±SD)	72.26±9.58	67.78±9.68	**p:0.002 ***
Gender (female/male)	42/40	99/99	p:0.853 #
DM (yes/no)	29/53	43/155	**p:0.017** #
HT (yes/no)	34/48	85/113	p: 0.821 #
CAD (yes/no)	11/71	17/181	p:0.220 #
Other pathology in the eye (yes/no)	69/13	11/187	**p<0.001** #
SD: Standard Deviation, DM: Diabetes Mellitus, HT: Hypertension, CAD: Coronary Artery Disease *Mann-Whitney U test, # Chi-square test			

DISCUSSION

For patients who are planned to undergo cataract surgery, the preoperative determination of accompanying retinal pathologies is important in respect of deciding the type of surgery to be performed and in predicting the postoperative vision prognosis (4, 5). The main diagnostic method used for this is biomicroscopic fundus examination (6, 7). However, in cases where the fundus cannot be visualised because of dense cataract, B-Scan ultrasonography is important in the determination of significant posterior segment pathologies which could affect the type and success of the surgery. Studies that have evaluated accompanying posterior segment pathologies in cases with mature cataract have generally concentrated on B-Scan ultrasonography (USG). It has been reported that various posterior segment pathologies were shown on preoperative USG at the rate of 5.2% by Bello et al., 8.6% by Salman et al., 8.9% by Ngweme et al., 12% by Qureshi et al., and 19.6% by Anteby et al. (8-10, 2, 3). In those studies, only major posterior segment pathologies such as RD, PVD, vitreous hemorrhage, and posterior staphyloma could be determined with B-Scan USG. More detailed evaluation with fundus examination and imaging methods can only be made after cataract surgery.

There is a limited number of studies in the literature that have postopeeratively evaluated accompanying posterior segment pathologies in cases with mature cataract and normal preoperative B-Scan USG findings. Jammal et al. examined 201 eyes of 179 patients with normal preoperative USG and indistinguishable fundus because of cataract, and determined reduced vision originating from the posterior segment in 26 (12.9%) eyes postoperatively. The most frequesntly seen pathologies were reported to be AMD (10 eyes, 38.5%) and diabetic maculopathy (6 eyes, 23.1%) and a similar pathology was seen in the fellow eye of 10 (38.5%) of these 26 eyes (11). Kim et al. evaluated postoperative intra-ocular pathologies in 115 eyes of 115 patients with mature cataract and normal B-Scan USG.

Postoperative intraocular pathologies were determined in 37 (32.2%) eyes, the most commonly seen of which were drusen (7 eyes, 6.1%), myopic degeneration (6 eyes, 5.2%), and diabetic retinopathy (5 eyes, 4.3%). No significant relationship was determined between the presence of intraocular pathology and age or systemic diseases. However, the same pathology was present in the fellow eye of 27 (73%) of the cases determined with pathology, and the presence of pathology in the fellow eye was reported to be the only risk factor in respect of the determination of pathology in the eye with mature cataract (12). In the current study, 280 eyes of 280 patients with normal preoperative USG were evaluated, and postoperative retinal pathologies were determined in 82 (29.3%) cases. The most frequently seen pathologies were dry type AMD, DRP, and ERM, and retinal pathologies were determined at a significantly higher rate in patients of an older age and in diabetic patients. Moreover, in 69 (84.1%) of the 82 cases determined with pathology, the same pathology was determined in the fellow eye in the preoperative examination. The rates of postoperative retinal pathology and the presence of pathology in the fellow eye in the current study are similar to those of the study by Kim et al, and higher than the rates reported by Jammal et al. This can be explained as follows: 1) In the study by Jammal et al., only retinal pathologies causing a decrease in vision were included, whereas in the current study all pathologies that could be determined on fundus examination or OCT were included, even if there was no reduced vision, and 2) Although Jammal et al. evaluated whether or not there was pathology in the fellow eye from the bilateral cases included in the study, in 9 cases the fellow eye pathology was not evaluated. In the current study, only unilateral cases were included and the fellow eye could be evaluated preoperatively in all cases.

In conclusion, as there could be retinal pathology in approximately one-third of cases with advanced cataract where the fundus cannot be visualised preoperatively, fundus examination must be performed in the early postoperative period. Advanced age and diabetes are significant risk factors for retinal pathologies. In addition, as the frequently seen pathologies are generally bilateral, preoperative examination of the fellow eye is important in predicting the presence of pathology in the eye with cataract.

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