

Ophthalmic Findings in Patients After Renal Transplantation

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ABSTRACT

The aim of the study was to perform complete ophthalmic examinations in patients after renal transplantation to determine ocular alterations and condition of the eyes. Moreover, ophthalmic findings were correlated with certain clinical characteristics related to transplantation such as post-operative renal functions and immunosuppressive regimen. The study was performed on 84 eyes of 42 patients who had received a renal transplant at least 6 months earlier. All patients underwent a complete ophthalmologic examination. In addition, in 33 (78.6%) patients peripapillary retinal nerve fiber layer (RNFL) thickness was determined using optical coherence tomography (Stratus OCT, Zeiss, Germany), which is a unique finding among renal transplantation patients. Recipients received immunosuppressive therapy consisting of tacrolimus, mycophenolate mofetil, and corticosteroid. Of 42 patients, 19 (45%) were women and 23 (55%) were men. The age of the patients ranged from 26 to 74 years, the mean age was 53.4 years. At least one ocular abnormality could be detected in 37 patients (88%), including impaired visual acuity (n = 31, 74%), keratoconjunctivitis sicca (n = 6, 14.3%), pinguecula (n = 3, 7.1%), arcus lipoides (n = 1, 2.4%), cataracts (n = 24, 57.1%), glaucoma (n = 2, 5%), retinal drusen (n = 6, 14.3%), and hypertensive or atherosclerotic retinopathy (n = 22, 52.4%). Twenty-five patients (75.8%) have reduced RNFL thickness. Cataract formation was positively correlated with age and usage of methylprednisolone. Moreover, RNFL thickness loss was correlated with transplantation duration and postoperative infections. Our study suggests that ocular disorders are frequent among renal transplantation patients. Besides immunosuppression and postoperative infection, aging is a high-risk factor in such cases.

SINCE the development of immunosuppressive drugs and the improvement of surgical techniques and high-quality care, renal transplantation has become an effective therapy for patients with end-stage renal disease. These patients have better survival rates and live a higher quality of life than patients on dialysis therapy [1]. After kidney transplantation, ophthalmic disorders are mainly secondary to the cause of the underlying renal disease, immunosuppressive regimen, metabolic changes, cytomegalovirus infection, or other postoperative infections.

In this cross-sectional study we analyzed the ocular findings in recipients after transplantation. Patients underwent detailed ophthalmic examination such as determination of best corrected visual acuity (BCVA), slit lamp and ocular fundus investigation, and intraocular pressure (IOP) measurement. Moreover, peripapillary retinal nerve fiber layer

(RNFL) thickness was studied using optical coherence tomography (OCT) in most patients.

PATIENTS AND METHODS

Between March and September 2016, renal transplantation patients were tended at the University of Debrecen, Hungary, and were referred for a comprehensive ophthalmologic examination. The study was performed on 42 patients (84 eyes) who had already received a renal transplant. Of these patients, 19 (45%) were female and 23 (55%) were male. In general, patients were examined 6 to 48 months after kidney transplantation, 20 (48%) within 2 years, and

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22 (52%) beyond 2 years. The post-transplantation immunosuppressive regimen consisted of single therapy in 1 (2.4%) patient, dual therapy in 5 (11.9%), and three-drug therapy in 36 (85.7%). The patient in single therapy was administered only tacrolimus (TAC). The dual-therapy recipients administered TAC and mycophenolate mofetil (MMF) (n = 2) or TAC with corticosteroid (n = 3). The 3-drug immunosuppressive regimen consisting of TAC, MMF, and steroid was used in 34 (81%) patients. One recipient received cyclosporine A with MMF and steroid, and another patient received TAC, steroid, and a mammalian target of rapamycin inhibitor. Altogether, 7 (16.7%) patients had diabetes mellitus and 31 (73.8%) had hypertension.

Firstly, visual acuity was estimated with Kettesy's decimal chart, then BCVA was determined, and IOP was measured with noncontact air-push tonometry (Topcon, Tokyo, Japan). The anterior segment of the eye was examined with a slit-lamp bio microscope and ocular fundus investigation was performed with wide-field fundus lens. In a major proportion of patients (n = 33, 78.6%), OCT examination was performed (61 eyes) to analyze the RNFL thickness.

Data were analyzed using the Student *t* test and χ^2 tests for comparing differences in mean values and frequencies, respectively. Statistical analysis was performed using SPSS 22.0 software (Armonk, New York, USA). Statistical significance was set at *P* < .05.

RESULTS

The major ocular findings in kidney transplanted patients are summarized in Table 1. At least one ocular abnormality could be detected in 37 recipients (88%). Impaired visual acuity was the most prevalent ocular abnormality. The mean BCVA was 0.88 ± 0.26 in the right eye and 0.91 ± 0.19 in the left eye. Thirty-one recipients (74%) needed spectacle correction by hyperopic (n = 22, 71%) or myopic (n = 9, 29%) lenses. Despite that, for more than one-third of the patients (n = 15, 35%), the correction was not possible in one or both eyes with dioptric lenses. The mean IOP was 14.7 ± 4.1 mm Hg in the right eye and 15.6 ± 3.4 mm Hg in the left eye. Moreover, 2 (5%) patients had higher pressure (>21 mm Hg), which may indicate glaucoma, so these patients underwent further examinations. One of the most frequent ocular disorders was cataract formation after renal transplantation, which was de novo in 21 recipients (87.5%); both eyes were affected in the same proportion. Cataract surgery had already been performed in four cases. Patients with cataracts were mainly >50 years old (*P* = .026), >60 years old (*P* = .054), or had been administered steroid for more than 1 year (*P* = .061). Results are shown in Table 2.

Table 1. Ocular Findings in Patients

Ocular Findings	Prevalence (%)	Patients	Both Eyes (%)
Refractive errors	73.8	31	74.2
Keratoconjunctivitis sicca	14.3	6	100
Pinguecula	7.1	3	100
Arcus lipoides	2.4	1	100
Cataracts	57.1	24	87.5
Glaucoma	2.4	2	100
Drusen	14.3	6	83.3
Retinopathia (both sclerotic and hypertensive)	52.4	22	100

Hypertensive (n = 16, 38%) and atherosclerotic retinopathy (n = 6, 14.3%) presented in more than half the proportion patients; however, diabetic retinopathy was not detected. Effect of sustaining steroid treatment was examined in patients with retinopathy (hypertensive or atherosclerotic). Recipients with retinopathy were mainly in the group that received steroid for 6 or fewer months (Table 3).

RNFL thickness loss was found in more than three-quarters of recipients (n = 25, 75.8%), which could be mild (n = 22, 65%) or severe (n = 14, 41%) reduction (Fig 1). The mean RNFL thickness in right and left eyes were 87.06 ± 16.64 μm and 85.28 ± 15.28 μm, respectively. Thicker RNFL was also detected in one-third of patients examined by OCT (n = 11, 33.3%). Reduced and thicker RNFL were found in one-fifth of patients at the same time (n = 7, 21.2%). In the case of thickness loss, patients were mainly more than 2 years after transplantation (*P* = .049) or they had postoperative infection (*P* = .085). The association with postoperative infection was the most significant in the inferior quadrant (*P* = .035). Additional correlations are summarized in Table 4.

DISCUSSION

The major finding of the present study was that 37 (88%) patients were affected by ocular disorders after kidney transplantation. The main manifestations of ophthalmic complications were refractive errors, cataract formation, and sclerotic or hypertensive retinopathy. According to our study, the possibility of visual deterioration occurs significantly more frequently with aging. The relatively high number of corneal and conjunctival degenerations was similar to other results [2,3]. Conjunctival degenerative lesions are usually caused by the long-term radiation from ultraviolet rays; however, age, male gender, smoking, and level of education are also associated with the formation of such alterations [4,5]. In the aspect of transplantation, photosensitivity caused by medication and the number of hours spent outdoors also are factors. Further study is needed to attribute causality of these risk factors in patients after renal transplantation.

Renal function after renal transplantation improves for most patients; however, unavoidable administration of immunosuppressive drugs can lead to ophthalmic

Table 2. Potential Risk Factors of Cataract

	Cataract		<i>P</i>
	No	Yes	
Age >50 yrs	32% (6)	62.5% (15)	.026
Age >60 yrs	11.1% (1)	37.5% (9)	.054
Gender	38.9% (7)	54.2% (13)	NS
Diabetes mellitus	19% (3)	17% (4)	NS
Delayed graft function	5.9% (1)	21.7% (5)	NS
CMV infection	17% (3)	13% (3)	NS
Steroid per os treatment >6 months	88.9% (16)	79.2% (19)	NS
Steroid per os treatment >12 months	33.3% (6)	62.5% (15)	.061

Abbreviations: CMV, cytomegalovirus; NS, nonsignificant. Numbers in parentheses indicate number of patients.

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