



## Comparison of Corneal Endothelial Cell Parameters Detected by Specular Microscopy Pre and Post Panretinal Photocoagulation Laser in Patients with Diabetic Retinopathy

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**ABSTRACT**

**Introduction:** The data appears to suggest that reduction in corneal endothelial cells is among the side-effects of retinal photocoagulation. The aim of this study, is to investigate the influence of retinal photocoagulation on the number and morphology of corneal endothelial cells.

**Methods:** Fifty eyes of 47diabetic patients were evaluated, and corneal endothelial cells were measured four times with Specular microscopy SP.3000P : just before retinal photocoagulation using an indirect ophthalmoscopy contact lens and 1month, 3 months and 6 months after that. This data was compared with the same data from 47 diabetic patients without Pan retinal photocoagulation.

There were no documented endothelial cell abnormality and history of previous eye surgery,in the patients enrolled in the study.

**Results:** No statistically significant reduction was found in corneal endothelialcell density before versus after retinal photocoagulation (P =0.2). Neither hexagonality nor Coefficient of variation, showed statically significant difference between thetwo groups ( P = 0.8 and 0.7), respectively.

**Conclusion:** Based on our investigation,retinal photocoagulation is a relatively safe method without any adverse effects on endothelial cells in patients with otherwise healthy endothelium.

**KEYWORDS**

corneal endothelial cell reduction – Diabetic Retinopathy ophthalmoscopy – retinal photocoagulation

**Introduction:**

The data appears to suggest that reduction in corneal endothelial cells is among the side-effects of retinal photocoagulation.(1,2)The aim of this study, is to investigate the influence of retinal photocoagulation on the number and morphology of corneal endothelial cells.

**Methods:**

Forty seven eyes of 47diabetic patients were evaluated as the case group and were compared with the same data from 47 diabetic patients without pan retinal photocoagulation. Average age of the patients was 59.38years in the case group and 60.6 ± 4.97 years in the control group. Patients with a history of diseases affecting corneal endothelial cells, previous eye surgery,trauma, glaucoma and uveitis,were excluded in both groups. Patients had no history of previous panretinal photocoagulation. The laser photocoagulation was performed by the same doctor at all sessions using condense lens 90 (Volk Optical Inc., Mentor, Ohio, USA).

The laser parameters were : Spot size 168.3 ± 37.9 µm; power 199.7 ± 12.4 mV; number of spots 1629.8 ± 20.1.

Corneal endothelial cells were measured four times with Specular microscopy SP.3000P : just before retinal photocoagulation using an indirect ophthalmoscopy contact lens and 1month, 3 months and 6 months after that in both groups.

Central corneal thickness was measured in all sessions in both groups by Topcon TRK-1P(Topcon, Tokyo, Japan) automated optical pachymeter.

**Results:**

There were 27 males in the control group and 26 in the treatment group. Females were 20 and 21 in each group, respectively.

Best corrected visual acuity at baseline is shown in table 1.

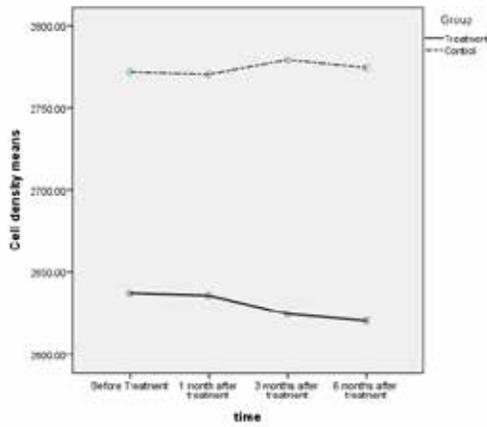
Count control		Group	
		treatment	
BCVA	20/600	7	19
	20/400	14	16
	20/300	12	11
	20/250	14	1

**Table 1.**Best Corrected Visual Acuity of the patients.

Mean cell density in the treatment group was 2637.08 ± 186.77 cells/mm at baseline, 2635.63 ± 185.85cells/mm after 1 month,2624.65± 184.89cells/mm after 3 months and 2620.55 ± 184.81 cells/mm after 6 months of treatment. These values were as follow in the control group, respectively : 2771.96 ± 176.51cells/mm, 2770.56 ± 168.79 cells/mm,2779.12 ± 161.65 and 2774.48 ± 173.12 cells/mm.

Based on repeated measure ANOVA, there were no statistically significant difference between the two groups values in time ( P = 0.2)

**Fig. 1, illustrates the changes of mean cell density in both groups in time.**



**Fig. 1.** Mean cell density changes in time in treatment and control groups.

The results of mean cell hexagonality, coefficient of variation and central corneal thickness of the two groups, is summarized in tables 2, 3 and 4. The repeated measure ANOVA, showed there were no statistically significant difference between the two groups values in time in none of the parameters : ( P = 0.8 , 0.7 and 0.4 respectively ).

Group	Mean	Std. Deviation	
Cell Hexagonality Before PRP	control	40.34	3.49
	treatment	36.88	3.06
Cell Hexagonality After 1 month	control	40.19	2.96
	treatment	36.38	3.047
Cell Hexagonality After 3 months	control	40.12	2.99
	treatment	36.23	2.58
Cell Hexagonality After 6 months	control	40.28	3.17
	treatment	36.32	2.90

**Table 2.** Mean cell hexagonality in time in the treatment and control groups.

Group	Mean	Std. Deviation	
CVBeforePRP	control	37.65	1.94
	treatment	37.52	2.92
CVAfter1month	control	37.66	1.60
	treatment	37.88	2.91
CVAfter3months	control	37.61	1.52
	treatment	37.75	2.33

CVAAfter6months	control	37.77	2.12
	treatment	37.56	3.05

**Table 3.** Mean coefficient of variation in time in the treatment and control groups.

	Group	Mean	Std. Deviation
CCT Before PRP	control	556.14	13.40
	treatment	551.65	15.79
CCT After 1 month	control	556.31	12.84
	treatment	551.53	15.84
CCT After 3 months	control	555.40	10.50
	treatment	551.68	15.93
CCT After 6 months	control	553.21	12.70
	treatment	552.08	14.90

**Table 4.** Mean central corneal density in time in the treatment and control groups.

**Discussion:**

Laser photocoagulation is a commonly used intervention to treat diabetic retinopathy (1) and previous studies indicates that corneal endothelial cell loss may occur with panretinal photocoagulation (2,3,4).

Pardos&Krachmer (2) demonstrated a correlation between argon laser photocoagulation energy and decreased corneal endothelial cells after 6 weeks in 22 diabetic eyes. On the contrary, Makitie et al. (5) in 1985, found no statistically significant decrease in corneal endothelial cell density following retinal photocoagulation.

We evaluated endothelial cell parameters of 47 eyes of diabetic patients with pan retinal laser photocoagulation, by using specular microscopy and corneal pachymetry and compared them with the same values gathered from 47 eyes of diabetic patients without pan retinal photocoagulation. After 6 months of follow up, the results of our study suggested that there were no statistically significant difference in the endothelial cell parameters between the two groups. Our patients had no documented endothelial cell pathology, and pan retinal photocoagulation has shown to be a safe procedure. Yet, further study of the issue is still required, as it remains to prove pan retinal laser photocoagulation safety in endothelial cell pathologies or after any eye surgery.

**REFERENCES**

1. Evans JR, Michelessi M, Virgili G (2004): Laser photocoagulation for proliferative diabetic retinopathy. Cochrane Database Syst Rev. 2014 Nov 24;11:CD011234. || 2. Pardos GJ & Krachmer JH (1981): Photocoagulation. Its effect on the corneal endothelial cell density of diabetics. Arch Ophthalmol 99: 84-86. || 3. Menchini U, Scialdone A, Pietroni C, Carones F & Brancato R (1990): Argon versus krypton panretinal photocoagulation side effects on the anterior segment. Ophthalmologica 201: 66-70. || 4. Hiroshi Murata, et al (2006): Corneal endothelial cell density reduction: a complication of retinal photocoagulation with an indirect ophthalmoscopy contact lens. Acta Ophthalmol. Scand. 2007; 85: 407-408 || 5. Makitie J, Koskenvuo M, Vannas A, Jarvinen E & Ahonen R (1985): Corneal endothelium after photocoagulation in diabetic patients. Acta Ophthalmologica 63: 355-360. |