Journal of Eye and Ophthalmology
ISSN 2055-2408 | Volume 4 | Article 2

HOAJ
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Original Research Open Access

Evaluation of the inner-retinal cells survival after low duration laser treatment measured by electroretinogram in patient with diabetic retinopathy

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Abstract

Background and Objective: To evaluate the Inner-retinal cells survival after low duration laser treatment (50ms duration) measured by electroretinogram in patient with diabetic retinopathy

Methods: Twenty-two eyes with severe nonproliferative diabetic retinopathy or proliferative diabetic retinopathy that underwent three panretinal photocoagulation treatments were prospectively followed. The patients were divided into two groups involving the standard laser or low-duration laser treatment. Survival of the inner retina was assessed using a full-field electroretinography involving changes in amplitude and implicit times of the b-wave rod response.

Results: There was no significant change in amplitude in eyes treated with the low-duration laser (-14.29±30.479 μV; p=0.172), but there was a significant change in eyes treated with the standard laser (-45.65±28.189 μV; p=0.001). There was no significant change in implicit times in each group (p=0.177 and p=0.685, respectively). The change in amplitude in eyes treated with the low-duration laser was significantly lower than in eyes treated with the standard laser (-71.43±25.408 versus 8.18±86.432, respectively; p=0.018).

Conclusions: Treatment with the low-duration laser is effective in maintaining the survival of inner retinal cells.

Keywords: Low duration Laser, Inner Retina Survival, Diabetic Retinopathy

Introduction

Diabetic retinopathy (DR) is the leading cause of blindness due to the ischemic condition of the disease. Numerous studies have reported that growth factors are the most important factors for the progression of DR leading to neovascularization. Vascular endothelial growth factor (VEGF) is considered the most important initiating factor responsible for severe complications due to proliferative diabetic retinopathy (PDR) of the inner retinal layers. The incidence of blindness due to DR varies from 6.8–44.4%, and is increasing both in developed and developing countries [1-3].

Panretinal photocoagulation (PRP) is still the main standard of treatment for PDR [4]. This treatment destroys some of the photoreceptors to reduce the oxygen demand in the outer layers of the retina. The retinal pigment epithelium (RPE) absorbs the laser radiation and transforms it into heat to destroy the surrounding cells, especially the photoreceptors located above the RPE. By destroying some of the photoreceptors, oxygen from the choriocapillaris passes through the outer retina and goes directly to the inner retina to restabilize the oxygen supply and demand. It is therefore reasonable to assume that the objective of PRP is to increase the oxygen supply to the inner retina to decrease the ischemic condition by destroying some of the photoreceptors [5].

Unfortunately, heat from photocoagulation frequently not only destroys photoreceptors but also affects other surround-