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Original Article

# Peripapillary nerve fiber layer thickness changes after macular photocoagulation for clinically significant diabetic macular edema

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## Abstract

*Purpose:* To evaluate the effect of macular photocoagulation (MPC) on peripapillary nerve fiber layer (PNFL) thickness measurement in patients with clinically significant diabetic macular edema (CSME).
*Methods:* This study was a prospective interventional case series. Patients with CSME underwent MPC. Optical coherence tomography (OCT) was used to measure the PNFL and central macular thicknesses before and 3 months after MPC.
*Results:* Thirty-three eyes of 25 patients with a mean age of 59.4 ± 7.2 years were included. There was no statistically significant difference between pre- and post-MPC mean best corrected visual acuity (0.35 ± 0.29 and 0.40 ± 0.23 LogMAR, respectively, $P = 0.2$). Mean baseline and 3 months central macular subfield thickness was 305.9 ± 90.7 and 317.5 ± 112.4 microns, respectively ($P = 0.1$). Peripapillary nerve fiber layer thickness was 105.7 ± 10.0 before and 106.1 ± 9.9 three months after MPC ($P = 0.7$). No significant differences were found between pre and post MPC measurements in temporal, nasal, inferior and superior nerve fiber layer thickness in each quadrant around optic nerve head ($P > 0.05$).
*Conclusions:* Macular photocoagulation has no statistically significant effect on PNFL thickness measurements in patients with CSME.

**Keywords**: Macular photocoagulation, Clinically significant macular edema, Nerve fiber layer


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## Introduction

Macular edema is one of the most common causes of visual impairment in patients with diabetic retinopathy.[1] Early Treatment Diabetic Retinopathy Study (ETDRS) demonstrated the benefit of macular photocoagulation (MPC) treatment on reducing the risk of moderate visual loss in eyes with clinically significant macular edema (CSME).[2] Although significant changes have occurred in the management of diabetic retinopathy, recent studies have shown the efficacy of focal/grid laser alone in eyes with non-center involved CSME or as an adjunct to intravitreal pharmacotherapy.[3–5]

Despite beneficial effect of MPC, it may be associated with considerable side effects, such as atrophic scarring causing paracentral dense scotomas, generalized loss of the visual field sensitivity, choroidal neovascularization, and subfoveal fibrosis.[6–11] Significant changes have been reported in the visual field of patients with CSME after MPC.[9–11] Since testing the visual field is one of the main parts of the diagnosis and management of glaucoma, the field defects after MPC may erroneously affect the decisions.

Optical coherence tomography (OCT) has become an integral part of the diagnosis and management of glaucoma and retinal disease. Measurement of peripapillary nerve fiber

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layer (PNFL) thickness can detect objectively and noninvasively glaucomatous nerve changes and disease progression.[12–14] Although previous studies using OCT reported the changes in the PNFL thickness measurements in eyes with diabetic retinopathy with and without CSME, the effect of MPC on PNFL thickness has not been evaluated.[15,16] The aim of this study was to evaluate the effect of MPC on PNFL thickness measurements in patients with CSME.

## Subjects and methods

In this prospective interventional case series, from May to October 2012, all patients with clinically significant diabetic macular edema (according to EDTRS classification)[2] who underwent MPC were included. We considered MPC for eyes with non-center involved macular edema. Patients who were eligible for intravitreal anti-vascular endothelial growth factor (VEGF) therapy but rejected the injections were also considered for MPC treatment. The study protocol was approved by the Rasoul Akram Hospital Eye Research Center Ethics Committee. Informed consents were obtained.

Exclusion criteria were history of intraocular surgery or laser photocoagulation during the last 8 months, high refractive errors (>6 diopters of sphere or >3 diopters of cylinder), media opacity affecting visual acuity and OCT measurements, history of glaucoma, ischemic or inflammatory optic neuropathy, uveitis, retinal vascular occlusion, disk shape abnormalities or large peripapillary atrophy, intraocular pressure more than 22 mmHg, vitreomacular interface disorders and the need for panretinal photocoagulation or anti-VEGF therapy during follow up. Both eyes of each participant were enrolled if both eyes met the inclusion criteria.

Baseline examinations included best corrected visual acuity measurement (BCVA) using a standard Snellen chart (converted to Log MAR), slit lamp and dilated fundus examinations, tonometry with a calibrated Goldmann

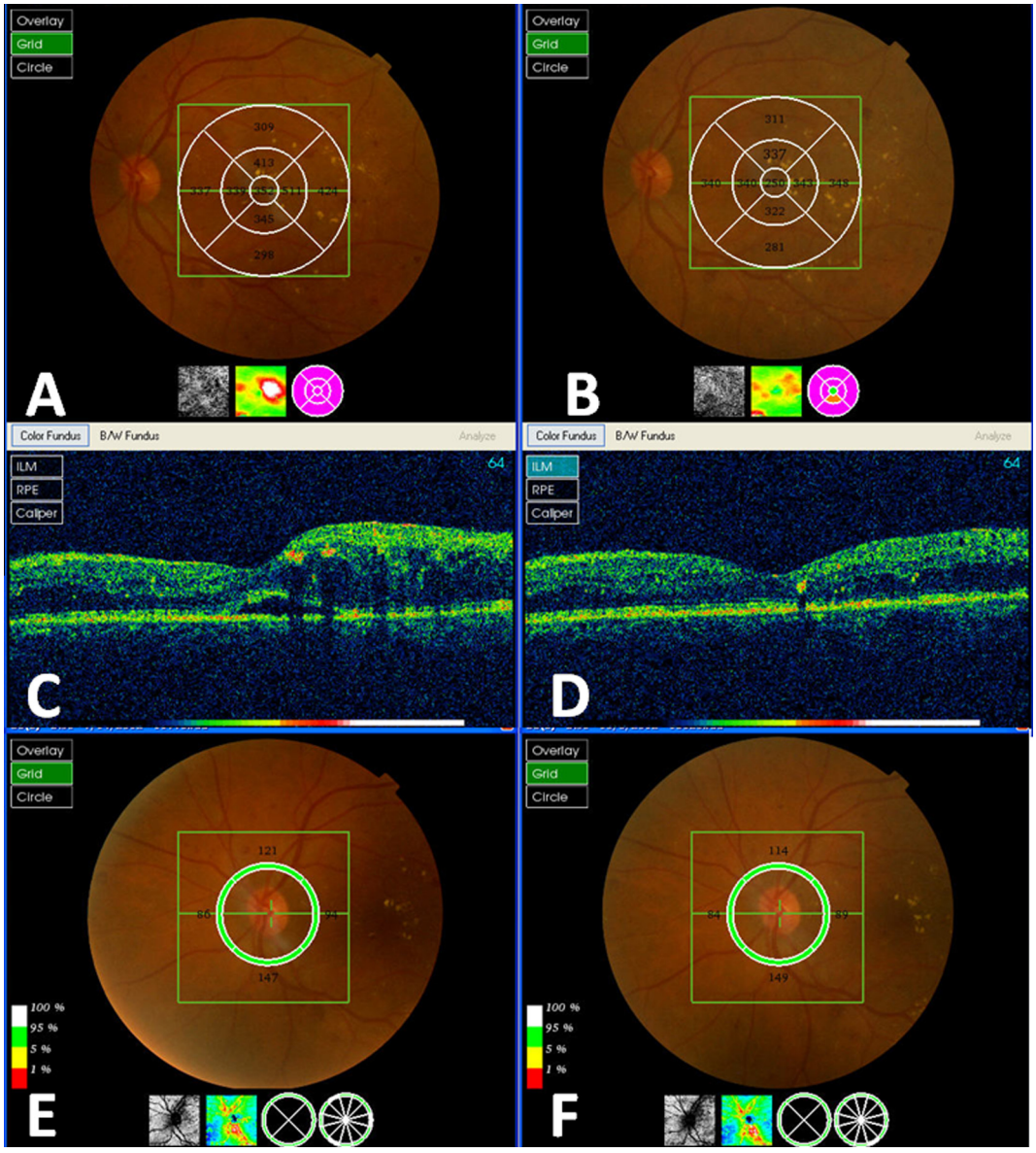


**Figure 1.** Pre- and post-laser treatment optical coherence tomography of a patient with center involving clinically significant diabetic macular edema. Central subfield thickness of 352 microns (A) improved to 250 microns (B). Subretinal fluid (C) resolved completely (D). Total peripapillary nerve fiber layer thickness was 112 microns before (E) and 109 microns (F) after laser treatment.