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Original article

Macular choroidal thickness in non-arteritic ischemic optic neuropathy^{☆,☆☆}



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ABSTRACT

Objective: To analyze macular choroidal thickness (MCT) in non-arteritic ischemic optic neuropathy (NAION).

Materials and methods: An analysis was made on 22 patients diagnosed with NAION (22 eyes) and 42 healthy controls (42 eyes) using enhanced-depth imaging of spectral-domain optical coherence tomography. A horizontal raster scan centered on the fovea was obtained per eye 3 months after the onset of NAION. Three measurements of MCT were obtained from the posterior edge of the retinal pigment epithelium to the choroid-sclera junction at 500 μm intervals. Statistical analysis was used to compare the mean MCT and to correlate MCT with other ocular and systemic parameters.

Results: Except for refractive error ($p = .01$), there were no statistically significant differences between both groups in axial length ($p = .53$), age ($p = .88$) and other epidemiological and ocular parameters. Mean MCT in NAION eyes and control group was $236.21 \pm 63.29 \mu\text{m}$ and 269.13 ± 52.28 , respectively. Mean MCT was significantly thinner in NAION eyes than in healthy eyes ($p = .03$). Thinner MCT, adjusted for refractive error, was associated with the diagnosis of NAION ($p = .04$).

Conclusions: Eyes affected by NAION showed significantly thinner MCT compared with healthy control eyes after adjusting for refractive error.

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Grosor coroideo macular en la neuropatía óptica isquémica anterior no arterítica

R E S U M E N

Palabras clave:

Coroides
Grosor coroideo macular
Neuropatía óptica isquémica
Tomografía de coherencia óptica
Enhanced depth imaging

Objetivo: Analizar el grosor coroideo macular (GCM) en la neuropatía óptica isquémica anterior no arterítica (NOIA-NA).

Material y métodos: Un total de 22 pacientes diagnosticados de NOIA-NA (22 ojos) y 42 sujetos sanos (42 ojos) fueron estudiados usando tomografía de coherencia óptica con técnica Enhanced Depth Imaging (EDI-OCT). Se realizó un escáner de una línea horizontal centrado en la fovea 3 meses después del inicio de NOIA-NA. Se tomaron 3 medidas desde la parte posterior del epitelio pigmentario hasta la unión esclerocoroidea a intervalos de 500 μm en las 1.500 μm centrales de la mácula. Los resultados fueron analizados estadísticamente comparando la media de GCM entre grupos y correlacionando el GCM con otros parámetros oculares y sistémicos.

Resultados: Excepto en el error refractivo ($p=0,01$), no hubo diferencias significativas en longitud axial ($p=0,53$), edad ($p=0,88$) ni en otros parámetros oculares ni epidemiológicos entre grupos. La media de GCM en la NOIA-NA y en el grupo control fue $236,21 \pm 63,29 \mu\text{m}$ y $269,13 \pm 52,28$, respectivamente. La media del GCM fue significativamente más delgada en ojos con NOIA-NA que en sanos ($p=0,03$). El adelgazamiento del GCM estuvo asociado con el diagnóstico de NOIA-NA después de ajustar por error refractivo ($p=0,04$).

Conclusiones: Los ojos afectados con NOIA-NA mostraron un GCM significativamente más adelgazado que en sujetos sanos, después de ajustar por error refractivo.

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Introduction

Macular choroidal thickness (MCT) studies have become widespread since Spaide et al. demonstrated the possibility of measuring it *in vivo* with optical coherence tomography.¹ The main function of the choroids is to provide oxygen and nutrients to the external layers of the retina, the pigment epithelium and the pre-laminar epithelium of the optic nerve. Even though quantitative MCT analysis need not be a direct reflection of its optimum function, its study could promote an understanding of the physiopathology of various ocular diseases in which this vascular layer could play an important role, as well as in serving as a tool for following up and monitoring the response to new treatments.^{2,3}

The objective of this paper is to determine the MCT in eyes affected by NAION and comparing it with MCT of healthy eyes. An additional objective is to study the correlation between MCT and age, sex, axial length, refractive error and other ocular and systemic parameters.

Subjects, material and methods

A study group comprising 22 patients diagnosed with NAION (22 eyes) was analyzed at the Neuro-Ophthalmological Department of the Virgen de la Victoria Hospital (Málaga) during the period between January 2014 and May 2015, together with a control group of 42 healthy subjects (42 eyes) examined at the general ophthalmology practice during the same period. The NAION diagnostic was made following sudden and painless loss of monocular vision with papillary edema, campimetric defects and angiographic study compatible with said disease.

In order to discard other disorders, a systemic and neurological study was made including erythrocyte sedimentation rate. All subjects experienced edema resolution before 2 months and followed a clinical course consistent with NAION. The eye affected by NAION was examined in patients with unilateral NAION (13 patients) and the last affected eye in patients with bilateral involvement (9 patients).

The control group included individuals treated for diseases that did not involve the retina or optic nerve and had normal ophthalmological examinations. Utilizing data from similar MCT studies, the sample size required to detect a minimum value in the difference of 40 μm was calculated utilizing a 2-row test with a confidence interval of 95%, statistical power of 90% and expected loss proportion of 10%. To avoid mistakes in data measurement and collection, the right eye was selected randomly for analysis in the control group. Subsequently, controls were collected consecutively to achieve the sample size. The study excluded subjects with opacity, coexistence of neurological diseases, previous ocular surgery (excepting cataract surgery without complications performed more than one year before being included in the study), refraction with spherical equivalent above 6D or axial length under 21 mm or greater than 26 mm. The Ethics Committee of the Research Office of Málaga approved the study in accordance with the Helsinki declaration and the laws of Spain. All subjects signed an informed consent.

The ophthalmological exploration included anterior pole study with slit lamp, intraocular pressure measured with applanation tonometry and posterior pole biomicroscopy with non-contact lens. Best corrected visual acuity was assessed with a Snellen optotype at 6 m with prior verification of subjective refraction, and the minimum angle resolution (logMAR) was transformed for statistical analysis. Refraction

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