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Original article

Clinical, fundoscopic, tomographic and angiographic characteristics of dome shaped macula classified by bulge height☆

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ABSTRACT

Objective: To classify dome shaped macula cases by their bulge height (BH). To analyze the characteristics associated with the groups formed by this classification.
Methods: Observational, descriptive and cross-sectional study on 15 selected eyes with dome shaped macula and high myopia. Using Caillaux method and optical coherence tomography images, 3 groups were determined by their BH: low (50–350 μm), medium (351–650 μm), and high (>650 μm), and a study of visual acuity, axial length, presence of subfoveal serous detachment, and images by fluorescein angiography and optic coherence tomography, as main variables. The confidence interval was 95%.
Results: By using the chi-squared test, the study showed that a BH higher than 400 μm was associated with lower visual acuity, presence of subfoveal serous detachment, and greater atrophy of the retinal pigment epithelium measured by disk diameters ($p < 0.05$).
Conclusions: The medium and high BH showed a positive correlation with the presence of foveal serous detachment and a lower visual acuity.

Estudio de las características clínicas, fundoscópicas, tomográficas y angiográficas de la mácula en domo según la altura de protrusión macular

Palabras clave:
Mácula en domo
Altura de protrusión macular

RESUMEN

Objetivo: Clasificar la mácula en domo según la altura de protrusión macular (AP) y analizar las características asociadas a cada grupo.

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Miopía magna
Desprendimiento seroso foveal
Angiografía fluoresceínica
Tomografía de coherencia óptica

Métodos: Estudio observacional, descriptivo y transversal. Selección de 15 ojos con mácula en domo y miopía magna. Utilizando imágenes por tomografía de coherencia óptica (OCT) y el método de Caillaux, se clasificó la AP en baja (50-350 μ), media (351-650 μ) y alta (>650 μ) y se estudió la agudeza visual, longitud axial, presencia de desprendimiento seroso subfoveal y las imágenes obtenidas por angiografía fluoresceínica y OCT como variables principales. El nivel de confianza utilizado fue de 95%.

Resultados: Utilizando el test de chi cuadrado, el estudio observó que una AP mayor a 400 μ se asoció con menor agudeza visual, mayor presencia de desprendimiento seroso subfoveal y mayor presencia de atrofia del epitelio pigmentario de la retina medida en diámetros de papila ($p < 0,05$).

Conclusiones: Las AP media y alta mostraron una asociación positiva con la presencia de desprendimiento seroso subfoveal y disminución de laagudeza visual.

Introduction

Dome-shaped macula (DM) is an anatomical finding in continuous research. It was first defined by Gaucher et al. in 2008[1] as a convex macular bulge within the concavity of a posterior staphyloma in high myopics detected by optical coherence tomography (OCT). Also by means of OCT, Imamura et al. proposed that increased subfoveal scleral thickness could explain the dome shaped and obstruct the exit of normal choroidal flow and diminishing visual acuity (VA) due to the appearance of subfoveal serous detachment (SSD).[2] Accordingly, in recent years, SSD has become particularly relevant due to its potential impact on low VA that patients with high myopia and DM could exhibit. Caillaux[3] proposed a first hypothesis about SSD presentation on the basis of its frequency according to the size of the macular bulge height (BH). Said authors found a higher frequency of SSD in domes with BH above 350 μm and proposed an association between the presence of SSD and diminished VA.

The present study aims at classifying DM in 3 groups (lo medium and high) according to macular BH and to analyze the clinic, funduscopic, tomographic and angiographic characteristics of each group to identify the factors involved in the low VA of these patients.

Patients and methods

Clinical records of patients with high myopia diagnostic were selected (spherical equivalents of 6 negative diopters or more) from the Retina practice in a retrospective selection from March 2015 to March 2016. From this group, patients exhibiting DM were selected, defined as the anatomic complexity of the macula within posterior staphyloma having a minimum BH of 50 μm as per the definitions by Ellabban[4] and Ohsugi.[5]

DM images were obtained by OCT *Cirrus Spectral Domain (Carl Zeiss Meditec, Dublin, CA, USA)*, and the search included images taken along the horizontal and vertical axis. Out of all the DM with high myopia found in the OCT archives, those fulfilling the following criteria were selected for the study: patients over 18 years of age, without concomitant retinal or systemic diseases that could affect the retina, without ophthalmological diseases that could affect VA (astigmatism, corneal scars, advanced cataracts, chronic glaucoma, etc.), who had not received to treatment with photodynamic therapy or retina or vitriol surgery.

Fourteen out of 26 DM patients fulfilled the above inclusion criteria, of which only 9 had complete ophthalmological exploration and documentation in the clinical records on file. Three of said 9 patients exhibited bilateral DM, obtaining 15 eyes with DM and high myopia that fulfilled all necessary requirements and were admitted in the study.

The classification of 15 eyes was carried out according to the Caillaux method: the OCT images were utilized for measuring BH through a vertical line (A) passing through the center of the fovea and the apex of the dome, followed by a horizontal line (B) tangential to the retina pigment epithelium (RPE) to coincide with the final boundaries of the dome (Fig. 1). Accordingly, BH was classified on the basis of the distance between the intersection of line A with the RPE up to the point of intersection of line B with line A. Said distances were classified in 3 groups: low (50–350 μm), medium (351 μm) and high BH (>650 μm). Five of the 15 eyes exhibited low, 8 had medium and 2 had high BH. The characteristics of the 15 eyes can be seen in Table 1.

Clinical record data were collected for the following variables: best corrected VA in the LogMar scale; autorefractometry; axial length measured by IOL Master; visual symptoms such as patient-referred central scotoma and presence of metamorphopsiae identified through the Amsler test; posterior pole funduscopic signs explored with pupil dilatation: macular hyperpigmentation, papilla macular bundle crests and obliquely implanted papilla; fluorescein angiography study: presence of SSD, identified as focal hyperfluorescent lesion with late leak, RPE atrophy and extension measured in papillary diameters, choroidal neovascularization; study with OCT *Cirrus Spectral Domain*: presence of SSD, RPE detachment, foveoschisis and choroidal neovascularization.

The results were analyzed utilizing the statistics application SPSS version 23 (IBM SPSS Statistics for Windows, Version 23.0., IBM Corp, Armonk, NY). The variables were positive in the normality test and therefore parametric tests were applied