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ORIGINAL ARTICLE

Perimetric progression using the Visual Field Index and the Advanced Glaucoma Intervention Study score and its clinical correlations

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Abstract
Purpose: To evaluate the association between clinical parameters and the diagnosis of progression using VFI (Visual Field Index) and AGIS (Advanced Glaucoma Intervention Study) score in primary open angle glaucoma.
Methods: Retrospective study of 517 visual fields of 78 eyes with primary open angle glaucoma analyzed with VFI and AGIS score. Clinical data registered included: age, sphere, pachimetry, basal intraocular pressure (IOP), and IOP during the follow up.
Results: Only the AGIS score diagnosis of progression was associated with the clinical parameters registered. Among the analyzed data, the mean IOP during follow up ($p = 0.0005$) and IOP at the third month of follow up ($p = 0.004$) were statistically associated with progression using the AGIS criteria.
Conclusion: The diagnosis of perimetric progression using the AGIS score in the current study was closer to the real functional progression than the diagnosis using the VFI, as the former was associated with known risk factors for progression in glaucoma.

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PALABRAS CLAVE
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Progresión perimétrica utilizando el índice del campo visual y la puntuación del estudio de intervención del glaucoma avanzado, y sus correlaciones clínicas

Resumen
Objetivo: Evaluar la asociación entre los parámetros clínicos y el diagnóstico de progresión utilizando el Índice del Campo Visual (VFI) y la Puntuación del Estudio de Intervención del Glaucoma en el glaucoma primario de ángulo abierto.
Métodos: Estudio retrospectivo de 517 campos visuales de 78 ojos con glaucoma primario de ángulo abierto analizados con VFI y la puntuación AGIS. Los datos clínicos registrados incluyeron: edad, esfera, paquimetría, presión intraocular (PIO) basal y PIO durante el seguimiento.
Resultados: Únicamente el diagnóstico de la progresión de la puntuación AGIS se asoció a los parámetros clínicos evaluados. Entre los datos analizados, la PIO media durante el seguimiento ($p = 0{,}0005$) y la PIO al tercer mes de seguimiento ($p = 0{,}004$) se asociaron estadísticamente a la progresión, utilizando los criterios AGIS.
Conclusión: El diagnóstico de la progresión perimétrica utilizando la puntuación AGIS en el estudio actual se acercó más a la progresión funcional real que el diagnóstico utilizando el VFI, ya que la primera se asoció a los factores de riesgo conocidos para la progresión del glaucoma.

Introduction

Glaucoma is a progressive disease in which optic nerve damage may increase in certain patients despite adequate treatment.[1] Several strategies are used to detect visual field (VF) damage progression: clinical judgment, event analysis, trend analysis, and defect classification systems.

Brusini and Johnson[2] established the features of the ideal system for VF progression detection, i.e., it should be standardized, objective, reproducible, user friendly, supported by scientific and clinical evidence, able to analyze data obtained from different models of perimeters, provide useful information on the characteristics of the VF defects, provide a classification consistent with structural damage data, widely used and accepted, able to monitor even relatively small changes in functional loss over time, and available on computer software for easy day-to-day clinical use. No currently available systems fulfill all these criteria.

There is no gold standard for glaucomatous functional worsening detection that can be used to test the different methods currently available to detect glaucomatous progression.[3,4] Thus, if we diagnose perimetric progression in an eye using certain method, absence of progression may be evident in the same eye using another method, and we simply cannot state which of both methods is correct.[5] As in any other field, the lack of an accurate method to detect VF progression has led to the development of several methods.[5,6] Unfortunately, we do not have adequate knowledge of the ability of each of them to provide useful clinical information.[4]

Most published studies that have analyzed the ability to detect VF progression arbitrarily chose one of the available methods to detect VF progression against which the new methods were compared.[3]

Ernest et al.[4] proposed a new approach to identify true perimetric progression in the absence of a gold standard. They stated that the detection method that diagnoses progression in eyes with more, well-known glaucoma progression risk factors is the one nearer to the gold standard in perimetric progression detection.

The Advanced Glaucoma Intervention Study (AGIS) score is one of the most specific perimetric progression diagnostic methods that has been reported.[7,8] The Visual Field Index (VFI) is an automated method for detecting perimetric progression designed for the Humphrey visual field (Humphrey Visual Fields, Carl Zeiss Inc., Dublin, CA, USA), which has been described elsewhere.[9] The VFI calculates the rate of perimetric progression, which is a useful parameter for glaucoma management, according to the more recent recommendations for glaucoma follow-up.[1,6] To the best of our knowledge, no studies have compared the perimetric behavior of both systems and their correlation with clinical parameters, including those considered to be risk factors for glaucoma progression.

Materials and methods

Patients with open-angle glaucoma under treatment attending the Glaucoma and Neuro-Ophthalmology Unit of the Hospital Universitario Príncipe de Asturias (Alcalá de Henares, Madrid, Spain) between January and May 2012 were studied retrospectively. All patients had a diagnosis of glaucoma based on the appearance of the optic disc and reproducible perimetric defects characteristic of glaucoma, at least four years of follow-up and five VFs obtained with a Humphrey Visual Field Analyzer II 745 (Carl Zeiss Inc., Dublin, CA, USA).

Patients were excluded if they had a visual acuity (VA) below 20/40, any concomitant pathology that could alter VF measurements, refractive errors over 5.0 diopters or 3.0 diopters of astigmatism and false positives, false negatives, and fixation errors over 25% in their visual fields.