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ORIGINAL ARTICLE

The effect of pharmacologic pupillary dilatation on anterior segment parameters in patients with exfoliation syndrome

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KEYWORDS
Exfoliation syndrome;
Anterior chamber depth;
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Ultrasound biomicroscopy;
Pupillary dilatation

Abstract
Purpose: The purpose of this study was to evaluate the effect of pharmacologic pupillary dilatation on anterior chamber depth (ACD) and anterior chamber angle (ACA) in eyes with exfoliation syndrome (XFS).
Methods: Thirty-six eyes of 36 patients with XFS were evaluated with slit-lamp examination, Goldmann applanation tonometry and ultrasound biomicroscopy (UBM) under standard light conditions. Primary outcome parameters were defined as the change in ACD and ACA measured before and 40 min after instillation of a single drop of either 1% cyclopentolate (Group I; $n = 12$), 2.5% phenylephrine (Group II; $n = 12$) or 1% tropicamide (Group III; $n = 12$). Change in intraocular pressure (IOP) during the same time interval was included as a secondary outcome measure.
Results: The average predilatation ACD, ACA and IOP values in the study subjects were 2.54 ± 0.40 mm, $27.9 \pm 6.3^{\circ}$ and 14.9 ± 3.1 mmHg, respectively. There were no significant differences in the mean age ($p = 0.461$), the female/male ratio ($p = 0.232$), baseline ACD ($p = 0.841$), ACA ($p = 0.761$) or IOP ($p = 0.070$) within the three groups. Differences in dilation induced changes in ACD ($p = 0.108$), ACA ($p = 0.636$) and IOP ($p = 0.160$) between the three groups were not statistically significant.
Conclusion: Pupillary dilatation with a single drop of 1.0% cyclopentolate, 2.5% phenylephrine or 1% tropicamide is not associated with shallowing of the anterior chamber or narrowing of the ACA in patients with XFS who present with open angles.

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PALABRAS CLAVE
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Ángulo de la cámara anterior;
Biomicroscopia ultrasónica;
Dilatación de la pupila

Efecto de la dilatación farmacológica de la pupila sobre los parámetros del segmento anterior en pacientes con síndrome de exfoliación

Resumen
Objetivo: El objetivo de este estudio fue el de evaluar el efecto de la dilatación farmacológica de la pupila sobre la profundidad de la cámara anterior (PCA) y el ángulo de la cámara anterior (ACA) en ojos con síndrome de exfoliación (SXF).
Métodos: Se evaluaron treinta y seis ojos de 36 pacientes con SXF mediante una lámpara de hendidura, tonometría de aplanación de Goldmann y biomicroscopia ultrasónica (BMU), en condiciones de iluminación estándar. Se definieron como parámetros de medida primarios del resultado a los cambios de PCA y ACA medidos con anterioridad y a los 40 minutos de la instilación de una única gota de ciclopentolato al 1% (Grupo I; n = 12), fenilefrina al 2,5% (Grupo II; n = 12) o tropicamida al 1% (Grupo III; n = 12). Se incluyó el cambio de la presión intraocular (PIO) durante el mismo intervalo de tiempo como medición secundaria del resultado.
Resultados: Los valores medios de PCA, ACA y PIO previos a la dilatación en los pacientes del estudio fueron de $2{,}54 \pm 0{,}40$ mm, $27{,}9 \pm 6{,}3^{\circ}$ y $14{,}9 \pm 3{,}1$ mmHg, respectivamente. No existieron diferencias en cuanto a la edad media (p = 0,461), el ratio hombre/mujer (p = 0,232), PCA basal (p = 0,841), ACA (p = 0,761) o PIO (p = 0,070) dentro de estos tres grupos. La diferencias en los cambios inducidos tras la dilatación en cuanto a PCA (p = 0,108), ACA (p = 0,636) y PIO (p = 0,160) entre los tres grupos no fueron estadísticamente significativos.
Conclusión: La dilatación de la pupila con una única gota de ciclopentolato al 1%, fenilefrina al 2,5% o tropicamida al 1% no está asociada a una disminución significativa de la profundidad de la cámara anterior o al estrechamiento de la ACA en los pacientes con SXF que presentan ángulos abiertos.

Introduction

Exfoliation syndrome (XFS) is the most common identifiable cause of secondary open-angle glaucoma with a prevalence of more than 50% of cases of open-angle glaucoma in certain geographic locations.[1,2] Patients with XFS need to be evaluated on a regular basis for the detection of glaucomatous optic neuropathy as elevated intraocular pressure (IOP) may result in a rapidly deteriorating visual function in these patients.[1,3,4] Combined with an older age, the presence of XFS increases the probability of observing miotic pupils during clinical evaluation and making optic disc evaluations difficult to perform without pupillary dilatation.[5] In clinical practice, pupillary dilatation is commonly performed using mydriatic or cycloplegic drops. Although one drop of short acting mydriatic agent such as 2.5% phenylephrine is sufficient for observing the posterior pole in eyes with light colored irides, darker brown-pigmented eyes may require a parasympatholytic agent such as 1% tropicamide or 1% cyclopentolate for adequate dilatation.[6] Pupillary dilatation is not without its own risks in the elderly population; it may induce an episode of angle-closure glaucoma in susceptible individuals who have certain risk factors such as female gender, increased age, thickened lens, shallow anterior chamber and narrow angle configuration.[7] The presence of XFS may compound these risk factors by inducing zonular laxity with resultant forward shift of the iris-lens diaphram and eventual increase in the degree of pupil block.[1,8] In addition, narrow-angle configuration is more frequently observed in subjects with XFS as compared to age-matched control subjects.[9,10]

The aim of this study was to test the hypothesis that pupillary dilatation may induce narrowing of the anterior chamber depth (ACD) and anterior chamber angle (ACA) in subjects with XFS who present with clinically normal angle widths.

Methods

The study was designed as a cross-sectional, observational study undertaken at a single university based hospital. The Tenets of the Declaration of Helsinki was followed throughout the study. Informed consent was obtained from all patients and the study was carried out with approval from the Institutional Review Board. Patients with clinical evidence of XFS were included this study. The diagnosis of XFS was made upon identification of fibrillogranular material at the pupillary ruff and/or the presence of typical anterior capsular appearance defined by the presence of central disc, clear intermediate zone and peripheral granular zone as observed with slit-lamp biomicroscopy. Clinical assessment of ACA width was made using the van Herick technique[11] and gonioscopy. Only subjects with brown colored iridiae were included. Exclusion criteria consisted of intraocular pressure of >21 mmHg on at least >2 office evaluations, ophthalmoscopic sign of glaucomatous optic nerve cupping, clinically evident narrow angles as defined by the presence of anterior chamber depth <1/2 of corneal thickness, iris bombe, visual field defects, pseudophakia, a history of intraocular surgery, glaucoma or posterior segment disease. Patients with mild to moderate grade of nuclear sclerosis were not excluded.