Journal of Optometry (2017) xxx, xxx–xxx

Journal of Optometry

www.journalofoptometry.org

ORIGINAL ARTICLE

Orbital magnetic resonance imaging is useful in age-related distance esotropia

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Received 23 November 2016; accepted 19 April 2017

KEYWORDS
Age-related distance esotropia;
Aging;
Extraocular rectus muscles;
Orbital magnetic resonance imaging;
Sagging eye syndrome;
Superior rectus–lateral rectus intermuscular band

Abstract
Purpose: To describe findings for orbital magnetic resonance imaging (MRI) in patients with age-related distance esotropia (ARDE).
Methods: We compared 31 orbital MRI from patients with ARDE (77 ± 7 SD years) with 2 control groups: 32 orbits from individuals aged 18–50 years (33 ± 8 SD years) and 16 orbits from individuals aged >60 years (77 ± 7 SD years). MRI scans were acquired using 3D fast field echo in T1 sequence without fat saturation. Exclusion criteria for all groups were neurological or thyroid disease and a relevant ophthalmological history (e.g., high myopia, diplopia from another etiology, complicated cataract surgery, etc.). Muscle displacement and characteristics of the lateral rectus–superior rectus (LR–SR) intermuscular band were analyzed.
Results: The analysis of the muscles and angles revealed a series of statistically significant differences ($p < 0.07$) between the groups. Subjects with ARDE had LR pulley positions 1.32 ± 0.19 mm lower than in younger controls, and the medial rectus (MR) pulley positions were 0.68 ± 0.19 mm lower than in younger. Older controls had LR and MR pulley positions 0.85 ± 0.20 mm and 0.49 ± 0.23 mm lower than in younger. ARDE subjects had LR pulley positions 0.46 ± 0.26 mm lower than in older control group. The LR–SR band was absent in 35.5% of ARDE patients and in 12.5% of older control group ($p = 0.168$).
Conclusions: MRI showed that displacements of LR and LR–SR band degeneration could facilitate the diagnosis of patients with ARDE.

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http://dx.doi.org/10.1016/j.optom.2017.04.002

Please cite this article in press as: Gómez de Liaño Sanchez P, et al. Orbital magnetic resonance imaging is useful in age-related distance esotropia. *J Optom.* (2017), http://dx.doi.org/10.1016/j.optom.2017.04.002

PALABRAS CLAVE
Esotropía asociada a la edad;
Envejecimiento;
Músculos rectos extraoculares;
Imagen de resonancia magnética orbitaria;
Síndrome de ''sagging eye'';
Banda intermuscular recto superior-recto lateral

Utilidad de la resonancia magnética orbitaria en la esotropía asociada a la edad

Resumen
Objetivo: Describir los hallazgos encontrados en la resonancia magnética orbitaria (RMN) en pacientes con esotropía asociada a la edad (ETAE).
Métodos: Comparamos 31 RMN orbitarias de pacientes con ETAE (77 ± 7 DE años) con 2 grupos control: 32 órbitas de individuos con edades comprendidas entre 18 y 50 años (33 ± 8 DE años) y 16 órbitas de individuos con edades >60 años (77 ± 7 DE años). Las RMN se adquirieron utilizando eco de campo rápido 3D en secuencia T1 sin saturación de grasa. Los criterios de exclusión para todos los grupos fueron enfermedad neurológica o tiroidea y antecedentes oftalmológicos relevantes (ej.: alta miopía, diplopía de otra etiología, cirugía complicada de cataratas ...). Se analizaron el desplazamiento muscular y las características de la banda intermuscular recto lateral-recto superior (RL-RS).
Resultados: El análisis de los músculos y ángulos reveló una serie de diferencias estadísticamente significativas ($p < 0,07$) entre los grupos. Los sujetos con ETAE presentaban la polea del RL 1,32 ± 0,19 mm inferior a los controles jóvenes y la polea del recto medial (RM) 0,68 ± 0,19 mm inferior a los sujetos jóvenes. Los controles de mayor edad tenían las poleas del RL y del RM posicionadas 0,85 ± 0,2 mm y 0,49 ± 0,23 mm inferiores a los jóvenes. Los sujetos con ETAE tenían la polea del RL 0,46 ± 0,26 mm inferior a la del grupo control de mayor edad. La banda RL-RS estaba ausente en el 35,5% de los pacientes con ETAE y en el 12,5% del grupo control de mayor edad ($p = 0,168$).
Conclusiones: La RMN reflejó que los desplazamientos del RL y la degeneración de la banda RL-RS podrían facilitar el diagnóstico de los pacientes con ETAE.

Introduction

Age-related distance esotropia (ARDE) is an acquired benign entity that manifests as comitant esotropia in adults patients with no history of neurological events or strabismus.[1] Degeneration of orbital connective tissue is associated with ARDE and manifests as blepharoptosis, superior sulcus defect, loss of inferior palpebral elasticity,[2] and esotropia, which in turn manifests as diplopia mainly in distant vision with orthoposition or phoria in near vision.

The role of orbital connective tissue in the etiology and pathogenesis of strabismus was unknown until recently. Imaging techniques have made it possible to analyze the muscle structures of the orbit[3,4] and determine some of the causes of strabismus.

In 2002, Clark and Demer[5] described inferior displacement of LR in older people that predisposed them to strabismus. Subsequent studies[2] reported degeneration of the lateral rectus–superior rectus (LR–SR) band in patients with ARDE.

Orbital magnetic resonance imaging (MRI) is a helpful diagnostic tool that is increasingly used in conditions affecting ocular motility. It could shown muscle position abnormalities, muscle contractures, intermuscular angle changes, and band and pulley alterations.

In some cases, positional abnormalities and connective tissue degeneration require surgical treatment; therefore, a complete presurgery workup is necessary so that treatment can be tailored.

The purpose of the present study was to describe orbital MRI findings in ARDE patients and compare them with those of controls aged 18–50 years and >60 years, in a European population.

Methods

This study was conducted according to the principles of the Declaration of Helsinki and approved by the ethics committee of Hospital General Universitario Gregorio Marañón (HGUGM), Madrid, Spain. All participants gave their written informed consent.

The subjects were recruited in the Ocular Motility and Diplopia department derived from the General Ophthalmology department of our hospital. The examinations performed for the recruitment were: complete medical history, best corrected visual acuity, motor and sensory examination and Lancaster-Hess chart. We asked the patients about the characteristics of the diplopia as well as if its perception was similar in primary position, side gaze and near vision. The measurement of the deviation in side gaze, near and far vision with horizontal and vertical prisms bar were performed. Worth, Lang and TNO tests were used for the sensory examination.

We analyzed 32 orbits from patients with ARDE (G.ARDE: 75% women, mean age 77 ± 7 SD years) and compared them with the control groups: G.1, 32 orbits from adult individuals aged 18–50 years (37.5% women, mean age 33 ± 8 SD years); and G.2, 16 orbits from individuals aged >60 years

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