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Case report

Stabilization in early adult-onset myopia with corneal refractive therapy

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ABSTRACT

Purpose: To describe the stabilization of early adult-onset myopia in three university students after initiating orthokeratology treatment with corneal refractive therapy contact lenses.
Methods: Three Caucasian early adult-onset progressing myopic subjects (1 male, 2 females) were fitted with corneal refractive therapy lenses to correct myopia between −1.50 and −2.50 D of sphere using Paragon CRT (Paragon Vision Sciences, Mesa, AZ) lenses for overnight orthokeratology. The pre-treatment refractive history from 2005 as well as refraction and axial length after treatment onset are reported over a period of 3 years between December 2009 and January 2013 with an additional year of follow-up after treatment discontinuation (January–December 2013). The peripheral refractive patterns and topographic changes are also reported individually.
Results: Treatment was successful in all three subjects achieving uncorrected visual acuity of 20/20 or better monocularly. During a period of 3 years of follow-up the subjects did not experience progression in their refractive error, nor in their axial length (measured during the last 2 years of treatment and 1 year after discontinuation). Furthermore, the subjects recovered to their baseline refraction and did not progressed further over the following year after lens wear discontinuation.
Conclusions: We cannot attribute a causative effect to the orthokeratology treatment alone as underlying mechanism for myopia stabilization in this 3 patients. However, the present report points to the possibility of stabilization of early adult-onset myopia progression in young adults using corneal refractive therapy treatment.

1. Introduction

Early onset myopia is the primary condition indicated for myopia control treatments involving different strategies. Children with myopia experience a faster rate of myopia progression between 8 and 12 years of age [1] and commonly progress at lower rates during adolescence and adulthood. Furthermore, there is evidence that younger children may progress in nearsightedness as a function of the time spent reading [2,3]. As a consequence, childhood-onset myopia presents a greater risk for higher dioptric values and a worse prognosis for potential co-morbidities in adulthood [4].

Early adult-onset myopia is regarded as being a more benign condition since it commences later in life and progresses at slower rates [5,6], and reaches lower final degrees of myopia compared with childhood-onset myopia. These patients also show altered accommodative and binocular function compared to age matched emmetropes [7]. Contrary to childhood-onset myopia, early adult-onset myopia rarely achieves values above −5.00 or −6.00 diopters of myopia which are generally associated with pathological myopia [8]. Despite this, eyes with lower values of myopia are also at significant risk of developing several pathological complications that might compromise visual function such as accommodative dysfunction and retinal pathology [3]. This is a matter of concern because of the potential future sequelae which includes severe retinal disease.

Corneal refractive therapy has reinforced its role as a viable option to correct low-to-moderate myopia during the last 10 years [9]. Corneal refractive therapy has proved to be efficacious to slow myopia progression in children in at least 5 different peer reviewed and published studies around the world [10–15], including one controlled randomized clinical trial [16–18]. However, these studies have been conducted only in early onset myopia. However, it might be the case that progression of adult-onset myopic could

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be susceptible to be reduced using orthokeratology, based on the same working principles of inducing relative peripheral myopic refraction.

The purpose of this case series of three individuals is to report axial and peripheral refraction, corneal topography and axial length over a period of four years after being fitted with corneal refractive therapy lenses.

2. Case reports

The three subjects were university students participating in a study involving myopia correction with corneal refractive therapy (Paragon CRT, Mesa, AZ) and decided to remain in this modality of visual correction after the study had finished by December 2009 [19]. They underwent yearly examinations thereafter between January 2010 and December 2012 comprising three years of corneal refractive therapy treatment and one year after lens discontinuation between January and December 2013, including non-cycloplegic refraction, corneal topography (Medmont E300, Australia) and axial length (IOL Master, Zeiss, Jena). All procedures at baseline as well as during follow-up were conducted by the same clinician and five repeated measures of biometry and three repeated measures of corneal topography were obtained at each follow-up visit. By recalling their old prescriptions (based on non-cycloplegic refraction as reported by them), we could verify that they were first corrected for very low myopia when they were

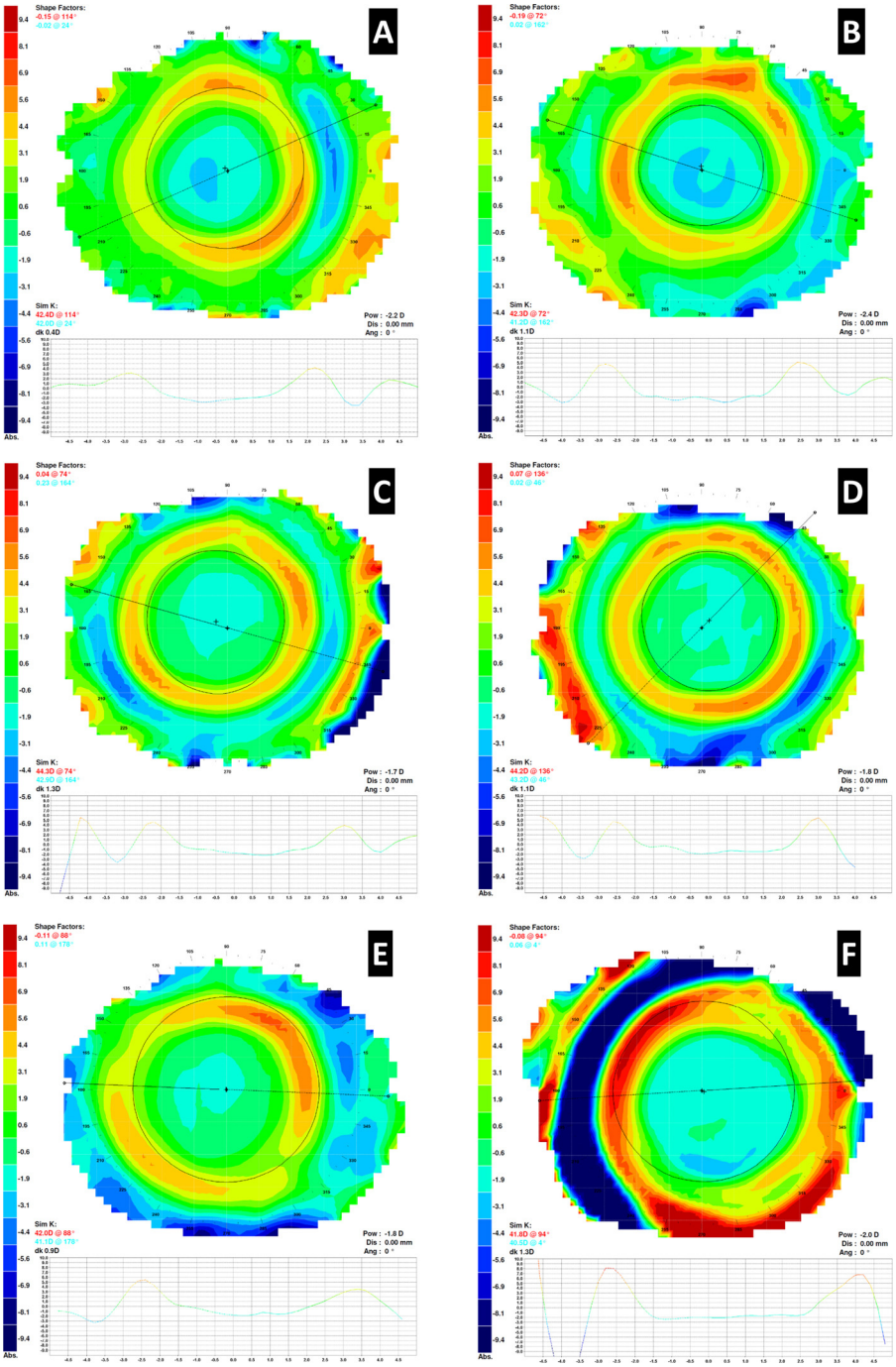

Fig. 1. Differential tangential curvature maps depicting the treatment zone of right eyes (A,C, E) and left eyes (B, D, F) for subject #1 (A, B), #2 (C, D) and #3 (E, F).