Journal of Optometry (2016) 9, 72–77

Journal of Optometry

www.journalofoptometry.org

ORIGINAL ARTICLE

Effect of ageing on keratoconic corneas

Michel Millodot[a,*], Ilya Ortenberg[b], Karen Lahav-Yacouel[b], Shmuel Behrman[b,1]

[a] School of Optometry and Vision Sciences, Cardiff University, Cardiff, UK
[b] Microlens, Tel Aviv, Israel

Received 5 March 2015; accepted 26 April 2015
Available online 2 July 2015

KEYWORDS
Keratoconus;
Age;
Corneal curvature;
BCVA

Abstract
Purpose: To explore the potential effect of ageing on the corneal curvature and corrected visual acuity in patients with long-term keratoconus because of the paucity of these patients older than 50 years.
Methods: Records of keratoconic patients, who had initially presented to a specialized contact lens clinic and followed for more than 20 years after disease onset, were reviewed. Collected information included age, gender, date of first and last examination, date of onset of the disease, central corneal curvature, refraction, best corrected visual acuity (BCVA), therapeutic modality and clinical signs.
Results: Age of patients at last examination was 53.8 years ± 7.2 (range 44–67 years). Disease onset was self-reported to be at age 18.4 years ± 3.8. First examination was at age 25.1 years ± 9.4 and the mean number of years between first and last examination was 28.7 years. Mean central corneal curvature was 6.87 mm (48.77 D) ± 0.65 and 6.56 mm (51.09 D) ± 0.74, at first and last examination, respectively, a difference which was significant ($p < 0.001$). However, the last measurement of corneal curvature was found to remain approximately constant over the years from about 20 to 50 years after onset. Mean BCVA was not significantly different between first and last examination and was found to be approximately constant over the years.
Conclusion: Corneal curvature became steeper possibly within the first 20 years after disease onset but remained approximately unchanged afterwards. Likewise, BCVA remained practically constant over the years indicating relative stability of the disease after 20 years.

* Corresponding author.
E-mail address: mmillodot@gmail.com (M. Millodot).
[1] Deceased

http://dx.doi.org/10.1016/j.optom.2015.05.001

PALABRAS CLAVE
Queratocono;
Edad;
Curvatura de la córnea

Efecto del envejecimiento sobre las córneas con queratocono

Resumen
Objetivo: Explorar el efecto potencial del envejecimiento sobre la curvatura de la córnea y la agudeza visual corregida en pacientes con queratocono a largo plazo, ya que hay una insuficiencia de estos pacientes con edades superiores a 50 años.
Métodos: Revisión de las historias de los pacientes con queratocono, que habían acudido inicialmente a una clínica especializada en lentes de contacto, y seguimiento durante más de 20 años desde el inicio de la enfermedad. La información recolectada incluyó edad, sexo, fecha de la primera y la última valoración, fecha de aparición de la enfermedad, curvatura central de la córnea, agudeza visual mejor corregida (BCVA), modalidad terapéutica y signos clínicos.
Resultados: La edad de los pacientes en el último examen fue de 53,8 años ± 7,2 (rango de 44 a 67 años). Los pacientes auto-reportaron el inicio de la enfermedad a los 18,4 años ± 3,8. El primer examen se realizó a los 25,1 años ± 9,4, siendo el número medio de años entre el primero y el último examen de 28,7 años. La media de la curvatura central de la córnea fue de 6,87 mm (48,77 D) ± 0,65 y 6,56 mm (51,09 D) ± 0,74, en el primero y el último examen, respectivamente, una diferencia que resultó significativa ($p < 0{,}001$). Sin embargo, se comprobó que la última medición de la curvatura de la córnea permanecía más o menos constante durante el transcurso de los años, durante 20 a 50 años desde el inicio. La BCVA media no resultó estadísticamente diferente entre el primero y el último examen, siendo más o menos constante con el paso de los años.
Conclusión: La curvatura de la córnea resultó más elevada dentro de los 20 primeros años desde la aparición de la enfermedad, pero no sufrió cambios posteriores. De igual modo, la BCVA permaneció prácticamente constante con el paso de los años, lo que indica una estabilidad relativa de la enfermedad con el transcurso de 20 años.

Introduction

It is a common observation that keratoconus (KC) is seen much less commonly in patients older than 50 years,[1–7] who had been diagnosed in their youth with the disease, although in one study the number of these patients was found to be substantial.[8] Nevertheless, it is surprising because KC is a chronic disease and one would expect to find a larger prevalence among patients older than 50 years than in a younger sample. Yet most studies of KC with this older age group have reported very low proportions: 7.4%,[3] 7.6%,[5] 10%,[1] 15%,[9] except 40% in one study.[8]

It could be thought that the proportion of the younger age group would be increased because in the last couple of decades more people have been diagnosed with the disease than before, owing to the wide usage of corneal topography and pachymetry. Moreover, allergic conditions which have become more prevalent in the general population[10] are known to be associated with many cases of KC,[11] and may also contribute to increasing the number of young subjects. Another consideration suggested by several authors[3,4,7] is that KC patients have a shorter life expectancy than the general population due to associated conditions, such as mitral valve prolapse,[12–14] asthma and obesity[15] or obstructive sleep apnea.[15–17] However, a study conducted in England in which the mortality rate for KC patients was compared with the general population showed no significant difference between the two groups,[2] although this study may have underestimated the true figure since the majority of patients examined was under 50 years of age. Still, some evidence of equal longevity of keratoconic and non-keratoconic patients was provided in a contact lens practice.[4] Underestimation of KC prevalence in the old may also result from patients who have developed a stable disease, who are managed and satisfied with spectacles or contact lenses; or who are resigned to poor vision and do not bother to attend hospital or private clinics; or perhaps have relocated after retirement.

There is of course the possibility that the corneas of KC patients stiffen with age, as is the case with normal corneas due to changes in corneal collagen fibrils,[18–21] resulting in a stable cornea or perhaps even a marked decrease in severity in some cases.[22] In any case, progression of the disease is generally considered to have stopped before the age of 40 after approximately 20 years since onset, if any progression had occurred.[5,23,24] It would seem reasonable to assume that patients and practitioners would be greatly interested to know what to expect in the long term, beyond 20 years of disease. The aim of this longitudinal retrospective study was to compare the central curvature and best corrected visual acuity (BCVA) of keratoconic patients examined at least 20 years earlier, with their recent findings, in order to determine whether their corneas continued to progress, stabilize or regress with time.

Methods

The clinical records from a long established, specialized private contact lens practice in Tel Aviv, Israel were used to provide data for this study. Between 70% and 80% of