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Retrospective analysis on myopia control with overnight orthokeratology

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Purpose

To analyze retrospectively the myopia progression in a group of patients from an optometric private clinic, who wore overnight orthokeratology contact lenses for at least five years.

Methods

The records of 89 patients of Visionlab, a private optometric clinic (Desenzano del Garda, Italy), who wore overnight orthokeratology lenses between January 2002 and December 2013, were reviewed. 32 records match the inclusion criteria: wear of lenses for at least 5 years, fitting of a new lens every year, myopia up to 6.00D, astigmatism less than 1.50D. Age and myopia of selected patients (14 male and 19 female) ranged respectively from 8 to 44 and from -0.50 to -5.75, with astigmatism no more than -1.25D, at the time of the treatment entrance.
Back Central Optics Radius (BCOR) and over refraction data of the first lens fitted (baseline) and subsequently of the every new lenses annually replaced, for a total of 5 years were retrieved and recorded. These records allowed to calculate the myopic progression at each lens replacement by summing the variation of the lens BCOR (converted in diopters) and the over refraction, according to the formula:

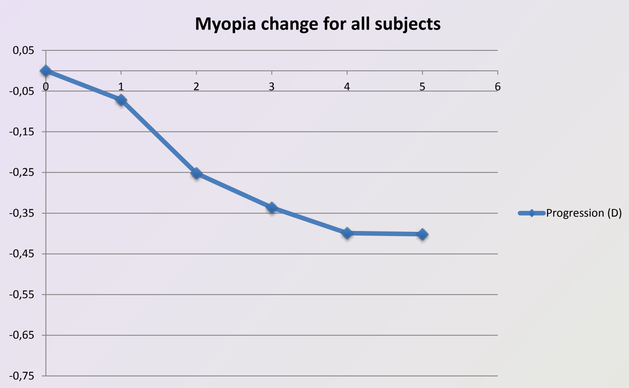
$$MyProgr(D) = \frac{n_k - n_a}{BCOR_{nl}\,(m)} - \frac{n_k - n_a}{BCOR_{bas}\,(m)} + \mathrm{OverRx}_{nl}\,(\mathrm{D}) - \mathrm{OverRX}_{bas}\,(\mathrm{D})$$

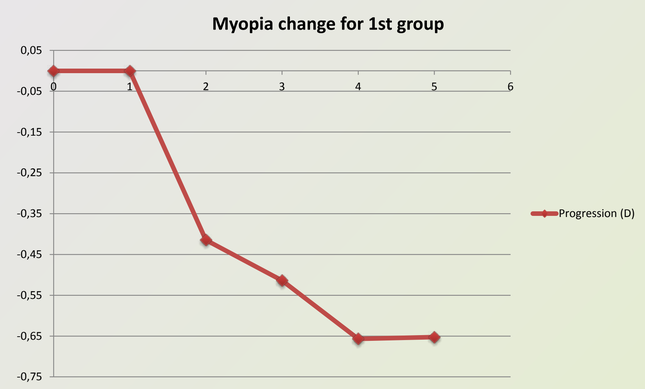
MyProg = myopia progression
n_k = keratometry refraction index
n_k = air refraction index
$BCOR_{nl}$ = New lens's Back Curve Optics Radius
$BCOR_{bas}$ = Baseline lens's Back Curve Optics Radius
$OverRx_{nl}$ = Over refraction on the new lens
$OverRx_{bas}$ = Over refraction on the baseline lens

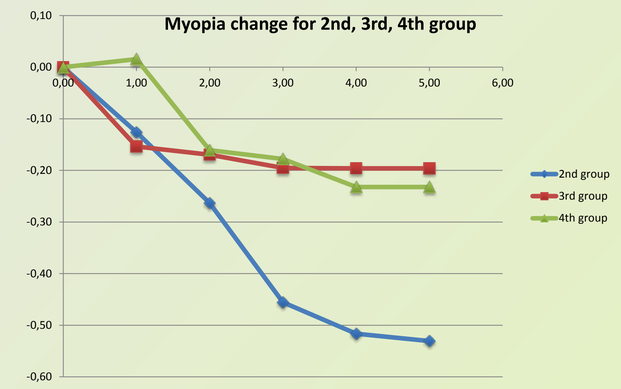
This procedure consents to determine the variation of the refractive error without the use of the washout period method proposed by Walline[1]

Results

Average myopic progression has been calculated for the entire group and for 4 subgroups arbitrarily arranged on the basis of the age at treatment entrance: 8-13 (group 1); 14-20 (group 2); 21-30 (group 3); 31-44 (group 4).
Myopic progression for the entire group was −0.40 (± 0.61) D after five years of treatment, and -0.07D (±0.34), -0.25D (± 0.46),-0.34D (±0.57), -0.40D (±0.62) at the first, second, third and fourth years respectively (see fig 1). Myopia progression for the first age group (8-13) was arrested in the first year of treatment, but showed the highest progression at the end of the fifth year: -0.65D (± 0.68), (see fig 2). The second group (14-20 years) showed a progression very similar to that of the first group, the last two groups (21-30, 31-44 years) had a very low progression, as could be expected (see fig 3).







Conclusions

Our 5-year study agrees with the numerous findings that overnight orthokeratology CL is a realistic clinical method to reduce myopic progression[2]. Even though a control group was not available, the results from the subgroup aged 8-13 can be compared with those from a number of studies[2-4] in which myopia progression rate for eyeglasses wearers is about -0.50D per year[3-4]. We found a progression of -0.13D per year for the first subgroup; this means a progression reduction of about 75%. Our results are similar to those of a retrospective orthokeratology study, with a control group, performed over a seven-year period[5], showing a reduction of myopia progression of about 80%.
Although prospective randomized studies are certainly necessary for rigorous scientific evidence, clinical retrospective analysis, where well conducted, could provide new research insights and strengthen the results of prospective studies.

Reference

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