# ORTHOKERATOLOGY AND MYOPIA CONTROL IN TWINS

ANDREA YEE • BRIANA BARON • JANICE JURKUS OD, MBA

ILLINOIS EYE INSTITUTE CORNEA AND CONTACT LENS CENTER FOR CLINICAL EXCELLENCE • CHICAGO, IL

## INTRODUCTION

Myopia is one of the most prevalent refractive errors, and increased amounts of myopia is a public health concern for young patients in particular as high myopia is associated with a number of ocular pathologies. Various methods have been deployed to attempt to slow the progression of myopia in children such as soft multifocal contact lenses, pharmaceutical patching and orthokeratology, with the latter continually gaining popularity[1]. Both genetic and environmental factors are known to influence the development of myopia, although the true extent of influence over myopic progression by each factor remains unclear[2]. Twin studies offer a unique opportunity to determine the role of genetics and environment on progression of myopia.

## PURPOSE

This case report explores the differences in reduction of myopic progression when genetic factors and the method of myopia control are held constant by comparing the results of twin girls undertaking myopia control via orthokeratology.

## CASE REPORT

Patients A and B are 9 year old twin females who presented to the Illinois Eye Institute with complaints of decreased vision. Their parents reported that the twins were experiencing significantly differing rates in refractive error change, and were interested in slowing the rate of myopic progression in both girls. Different myopia control options were presented to the family, including orthokeratology, soft multifocal lenses, and atropine patching, and they elected to try orthokeratology.

## RESULTS

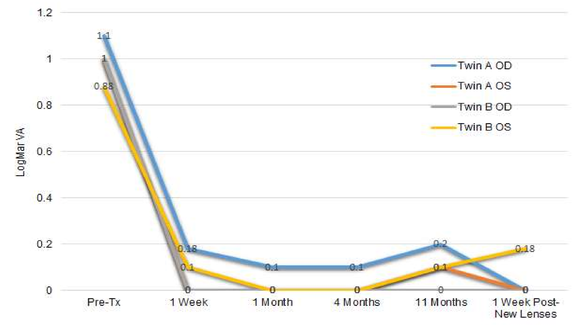
We analyzed changes in unaided visual acuities and corneal topographies over the course of a year of treatment to determine the efficacy of orthokeratology.

Table 1. Summary of pertinent patient data.

| Twin A | OD | OS |
|---|---|---|
| **Refractive Error** | -4.25-0.75x103 | -5.50 DS |
| **Keratometry** | 45.25/45.25@116 | 45.50/46.00@048 |
| **Eccentricity / Shape Factor** | 0.57 / 0.32 | 0.53 / 0.28 |
| **1st Lenses Dispensed** (Power/BC/Diameter) | Euclid Emerald +0.75/8.39/10.60 | Euclid Emerald +0.75/8.60/10.20 |
| **Over-refraction** | Plano DS | +0.25 DS |
| **1 Week Post-fit Topo.** | Well-formed, well-centered treatment (Tx) zones | |
| **11 Month Post-fit Topo.** | Mild central island | Decentered Tx zone |
| **2nd Lenses Dispensed** (Power/BC/Diameter) | Euclid Emerald +1.25/8.49/10.60 | Euclid Topaz +0.75/8.60/10.20 |
| **Over-refraction** | -0.25 DS | Plano DS |

| Twin B | OD | OS |
|---|---|---|
| **Refractive Error** | -3.00-0.50x090 | -3.25-0.50x090 |
| **Keratometry** | 44.75/44.75@090 | 45.50/46.00@090 |
| **Eccentricity / Shape Factor** | 0.61 / 0.37 | 0.53 / 0.28 |
| **1st Lenses Dispensed** (Power/BC/Diameter) | Euclid Emerald +0.75/8.23/10.60 | Euclid Emerald +0.75/8.13/10.60 |
| **Over-refraction** | Plano DS | Plano DS |
| **1 Week Post-fit Topo.** | Well-formed, well-centered treatment zones | |
| **11 Month Post-fit Topo.** | Stable, well-defined and centered treatment zones | |
| **2nd Lenses Dispensed** (Power/BC/Diameter) | Euclid Emerald +1.00/8.18/10.60 | Euclid Emerald +0.75/8.23/10.60 |
| **Over-refraction** | Plano DS | Plano DS |

Figure 1. Change in unaided visual acuities for Twin A (OD, OS) and Twin B (OD, OS) over the course of one year of orthokeratology treatment.




## DISCUSSION

Due to the nature of this retrospective study, we were unable to collect all the data necessary to determine the amount of myopic progression that had occurred since treatment. However, for future studies, progression can be quantified by axial length measurements, over-refractions over old lenses, or temporarily discontinuing treatment to evaluate the refractive error after allowing a wash-out period for the corneal reshaping effects of orthokeratology.

## CONCLUSION

Orthokeratology is an effective myopia control method. Current reports have shown that the type of myopia control selected between twins can alter the course of their myopic progression dramatically[3].

This case report compares the factors that can contribute to the success of slowing myopic progression between twins using the same method of myopia control – in this case, with orthokeratology. Although the twins did not start treatment with the same refractive error, it appeared that orthokeratology led to a similar rate of reduction in myopic progression. It is unclear as to what caused the initial differences between the rate of myopic progression between the twins, however, since the twins appear to have experienced similar rates of slowing of progression of myopia, this report suggests that the factors that initially contributed to the difference in myopic progression between the girls do not have the same effect on the slowing of progression through orthokeratology when genetics, age, gender, and home environment are held as constants.

## REFERENCES

1. Cho P, Cheung SW, Mountford J, White P. Good clinical practice in orthokeratology. Contact Lens and & Anterior Eye. 2008 Feb. 31(1):17-28.

2. Lyhne N, Sjølie AK, Kyvik KO, Green A. The importance of genes and environment for ocular refraction and its determiners: a population based study among 20–45 year old twins. Br J Ophthalmol. 2001 Dec. 85:1470-1476.

3. Chan KY, Cheung SW, Cho P. Orthokeratology for slowing myopic progression in a pair of identical twins. Contact Lens & Anterior Eye. 2013 Oct. 37(2):116-119.

## CONTACT INFORMATION

ANDREA YEE
AYEE@EYEDOC.ICO.EDU

BRIANA BARON
BBARON@EYEDOC.ICO.EDU

JANICE JURKUS OD, MBA
JJURKUS@.ICO.EDU