

Background

Orthokeratology (OK) is the use of reverse geometry gas permeable contact lenses (CLs) to reshape the cornea for the correction of refractive error. OK wear has also been shown to be effective in slowing myopia progression and axial length elongation in children.¹

Moderate to high corneal astigmatism can be a challenge for OK fitting, causing poor lens centration and inadequate unaided daytime vision.^{2,3} The use of OK CLs with toric periphery may improve their performance for astigmatic corneas.

Purpose

This case report demonstrates the successful use of OK with a toric periphery design to provide myopia control treatment in a young Asian female.

Case History

- A 10-year-old Asian female was referred to the University of Waterloo Contact Lens Clinic from the Pediatric Clinic for myopia control treatment.
- The patient was previously monitored in the Pediatric and the Binocular Vision Clinics for high astigmatism and binocular meridional amblyopia. Her vision improved with full-time glasses wear and the astigmatism remained stable.
- The patient first became myopic at age 7 and her myopia continued to progress at the rate of approximately -0.50D each year.
- Her parents were concerned about myopia progression; treatment options for myopia control were discussed at her latest annual eye exam in the Pediatric Clinic.
- The patient is healthy and has no ocular conditions. Her father is myopic.

Initial Assessment

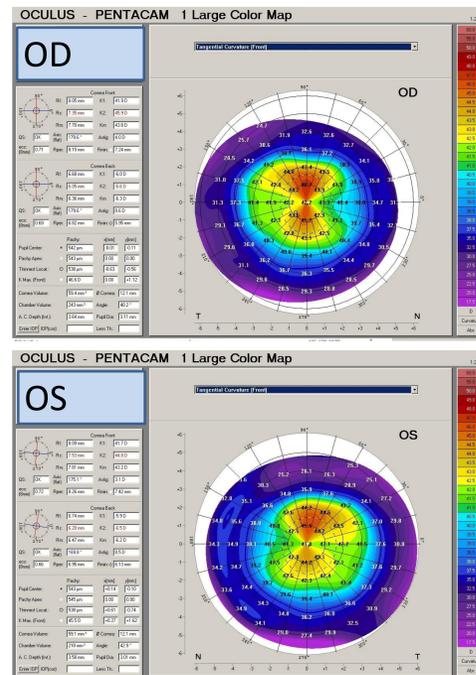


Figure 1: Pentacam topographies of the right and left eye at the initial assessment.

At the myopia control consultation, the patient and her mother were presented the following treatment options: low-dose atropine, soft multi-focal contact lens, and OK. After the benefits and risks of each option was clearly communicated, the patient's mother expressed great interest in OK. She was made aware of the potential difficulty of achieving adequate daytime vision and CL centration due to high corneal astigmatism.

Corneal topographies showed high amounts of regular, central corneal astigmatism. Ocular health was clear in both eyes. The exam findings are presented below:

OD	Test Result	OS
-1.25 -2.00 x 180 20/30 ⁺²	Current Spectacles	-1.25 -2.00 x 180 20/30 ⁺²
-1.75 -2.00 x 172 20/20 ⁻³	Subjective Refraction	-1.75 -2.00 x 177 20/20 ⁻²
24.67mm	Axial Length	24.60mm
41.9D @ 179.6 / 45.9D	Keratometry	41.7D @ 175.1 / 44.8
4.0D	Corneal Astigmatism	3.1D

Conclusion

The correction of corneal astigmatism can be a challenge for OK fitting; the use of traditional spherical OK CLs can result in poor lens centration and inadequate vision correction. This case report demonstrates that OK lens designs with toric periphery can be used effectively in patients with high corneal toricity. Practitioners can easily select an initial lens using the manufacturer's lens calculator. Corneal astigmatism continues to be a challenge in the provision of myopia control treatments in children, and additional CL options that correct for astigmatism need to be investigated.

References

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- Maseedupally VK, Gifford P, Lum E, et al. Treatment zone decentration during orthokeratology on eyes with corneal toricity. Optom Vis Sci. 2016;93(9):1101-1111. doi:10.1097/OPX.0000000000000896
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Toric Periphery Orthokeratology Fitting

Paragon CRT Dual Axis® OK CLs (paflucocon B, 100 Dk) were fitted for this patient. The CL parameters were selected using the manufacturer's lens selector calculator.

The CLs showed adequate centration, even pooling in the return zone, and equal bearing in the alignment zone. The CLs were dispensed after insertion & removal training and lens care training. The detailed CL parameters are presented below:

OD	Lens Parameter	OS
CRT Dual Axis®	Lens Name	CRT Dual Axis®
8.60	Base Curve (mm)	8.60
10.5	Len Diameter (mm)	10.5
+0.50D	Power (D)	+0.50D
525/625	Return Zone Depth	525/625
31	Landing Zone Angle	31

1-week Progress Check

The patient reported good daytime vision lasting into the evening. Unaided VA measured 20/25 OD and OS. Topographies showed slight temporally decentered treatment zones.

3-month Progress Check

Unaided VA was 20/20 OD and OS. Balanced refraction without CLs were plano OD and +0.25 OS. Topographies showed adequate treatment zone size and lens centration. Corneal astigmatism decreased by 2.1DC OD and 1.5DC OS compared to baseline. Difference maps after 3 months of OK wear are shown to the right.

The patient is very satisfied with the performance of the OKs; she reported clear vision during the day and good comfort of the CLs. No ocular complications were detected during lens wear. This patient will be followed up at six-month intervals.

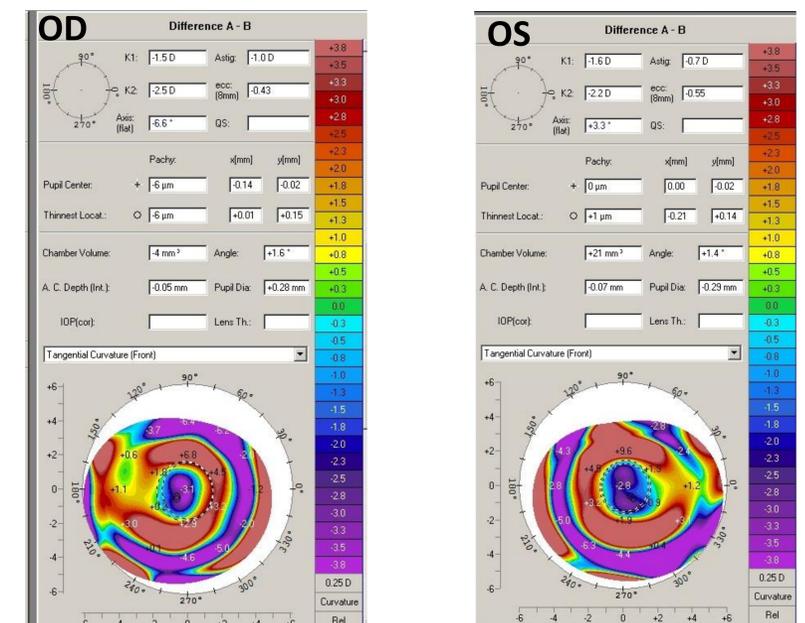


Figure 2: Tangential difference maps between the 3-month follow-up and baseline for the right and left eye