Salus at Drexel University

*Pending USED and accreditor approvals.

Importance of Corneal Diameter in Orthokeratology Lens Design

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BACKGROUND

The prevalence of myopia, which increases risk for ocular disease and other complications, is increasing.[1] Orthokeratology is a method of myopia management that uses overnight reverse geometry gas-permeable lenses to correct refractive error. It has been shown to slow axial growth.[2-3] Corneal curvatures and refractive error are important considerations for successful lens design; furthermore, corneal diameter can affect lens centration and visual outcome.

CASE DESCRIPTION

A 10-year-old Hispanic male presented for orthokeratology fitting for management of myopia.

	Spectacle Rx	BCVA	Keratometry
OD	-4.00-0.75x180	20/20	41.25/41.75
OS	-3.75-0.75x165	20/20	41.50/42.00

Table 1. Baseline data.

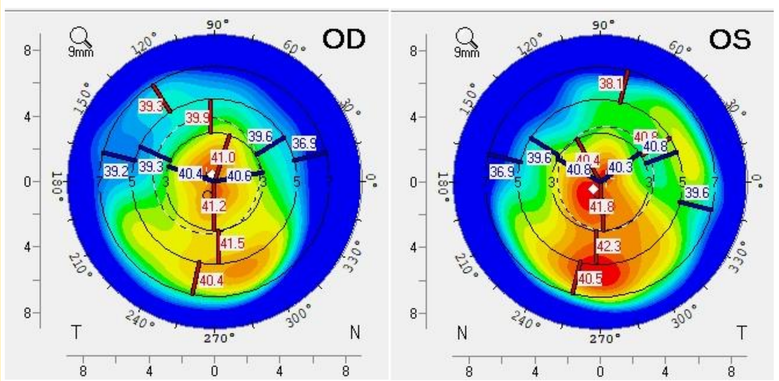

Figure 1. Baseline topographies.

REFERENCES

1. Holden BA, Fricke TR, Wilson DA, Jong M, Naidoo KS, Sankaridurg P, Wong TY, Naduvilath TJ, Resnikoff S. Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050. *Ophthalmology*. 2016 May;123(5):1036–1042.
2. Cho W, Cheung SW. Retardation of myopia in Orthokeratology (ROMIO) study: a 2-year randomized clinical trial. *Invest Ophthalmol Vis Sci*. 2012 Oct 11;53(11):7077–85.
3. Walline, J, M Rah, and L Jones. "COOKI: The Children's Overnight Orthokeratology Investigation Pilot Study." *Optom Vis Sci*. 2004 Jun;81(6): 407-13.

INITIAL LENS

Lenses were designed empirically off his baseline data and then trialed.

	Lens	BC	Rx	OAD
OD initial	Euclid	41.25/41.50	-4.25-0.50x010	11.0
OS initial	Euclid	41.25/41.75	-4.00-0.50x160	11.0

Table 2. Initial lens parameters.

Upon dispense the patient found the lenses to be a bit uncomfortable. VA was 20/20 in each eye; however, the lenses decentered nasally. The patient was still encouraged to trial the lenses and return for a one-day evaluation.

The next day the patient's vision had not improved and topography did not show a distinct pattern. The patient was advised to continue wear for another week and return for evaluation.

Ten days later, VA was 20/40 in each eye with no improvement on over-refraction. Topography then revealed the lenses were definitely decentered overnight.

HVID was remeasured and found to be larger than originally expected, at 12.9mm.

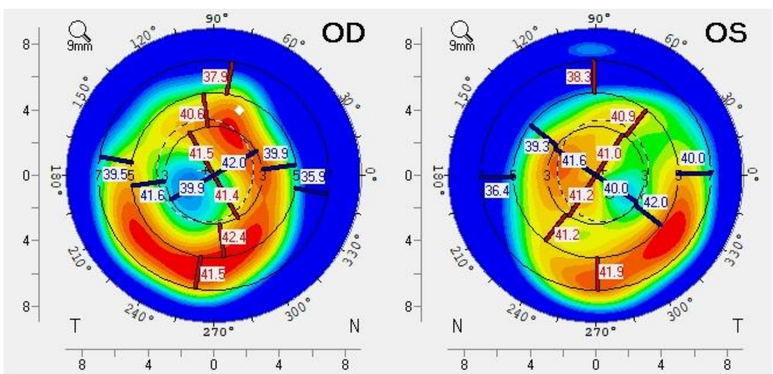

Figure 2. Topographies after ten days of initial lens wear.

FINAL LENS

Lenses were redesigned empirically from an original 11.0 OAD to 11.4mm.

	Lens	BC	Rx	OAD
OD final	Euclid	41.25/41.50	-4.25-0.50x010	**11.4**
OS final	Euclid	41.25/41.75	-4.00-0.50x160	**11.4**

Table 3. Final lens parameters.

	OAD	OZD	PC1W	PC2W	PC3W	PC4W
Initial	**11.0**	5.8	0.6	**0.8**	**0.7**	0.5
Final	**11.4**	5.8	0.6	**0.85**	**0.85**	0.5

Table 4. Comparison of initial and final lens widths.

The patient followed up for another dispense and found the new lenses to be more comfortable. **After a week** of trial, vision was improved to 20/25 in each eye. No corneal staining was seen. They returned **another week later** for a final assessment to find well-centered treatment zones on topography and 20/20 vision in each eye. The larger OAD had improved centration.

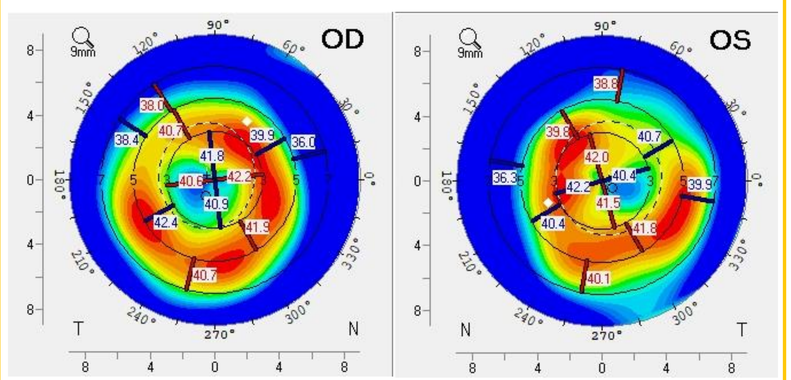

Figure 3. Topographies after two weeks of final lens wear.

CONCLUSION

HVID is an important parameter in orthokeratology lens design. A lens with inappropriate OAD may result in a decentered treatment zone, usually laterally, and suboptimal visual outcome. In this case, the successful lens required a larger diameter to account for the patient's large corneas. Topography can be a useful tool to accurately measure HVID.