

That's Flat Out Crazy! Off Label Use of Orthokeratology in Managing Atypical Myopia Control Patient

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Background

Myopia progression is an epidemic worldwide.^{1,2} Orthokeratology (OK) is a treatment for myopia in which RGP lenses worn at night reshape the cornea and simultaneously correct peripheral hyperopic defocus, thereby temporarily correcting myopic refractive error and slowing axial elongation.¹ Currently, Boston Equalens II OK lenses are FDA approved for temporary reduction of myopia up to -5.00 DS and -1.50 DC.³ This case illustrates the off-label use of Boston Equalens II (oprifocon A) OK lenses in a patient with progressive myopia, flat corneas, and a higher refractive error than indicated for temporary reduction of myopia.

Case Details:

16-year-old white female presents for orthokeratology lens fit for myopia management. Cycloplegic refraction revealed moderate myopia with >1.00DC OU. Topography revealed flat keratometry values (Ks) and with-the-rule (WTR) astigmatism. Patient was fit into custom ortho-K lenses using proprietary software. To achieve greater flattening the lenses were ordered with a flatter return zone curve. After 6 months of treatment there was no axial progression.

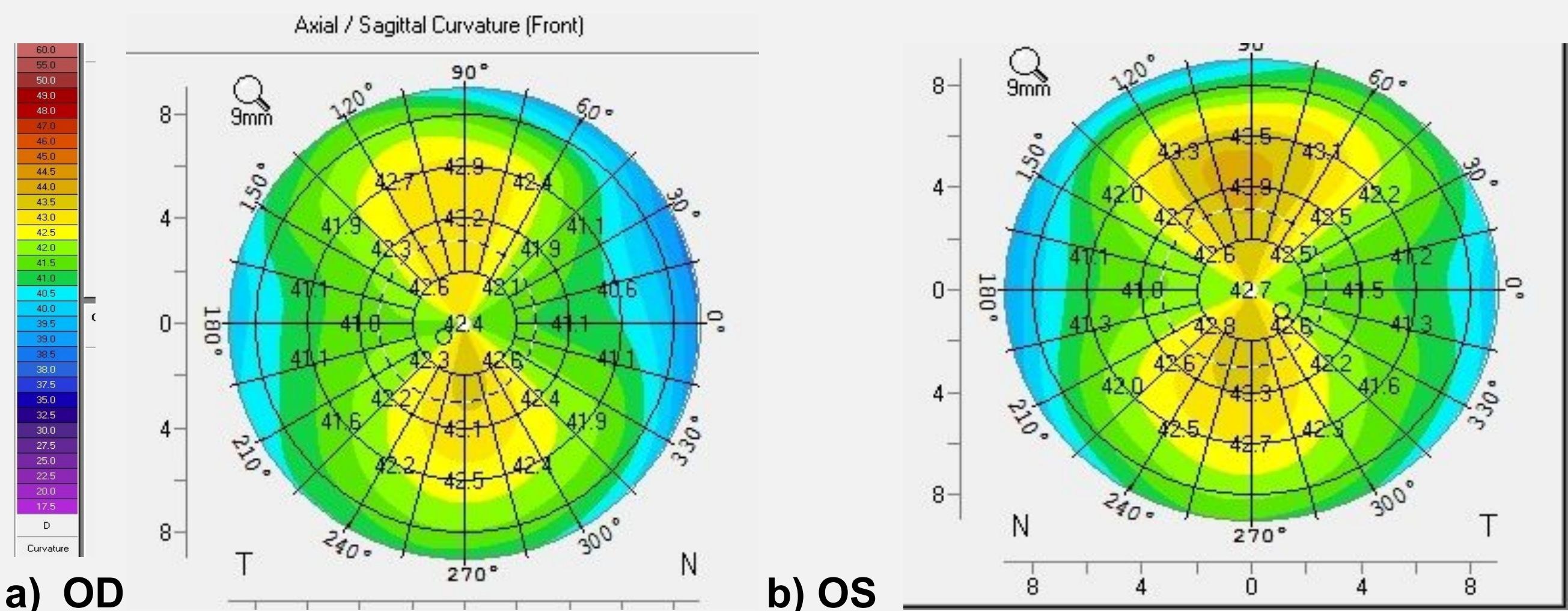
Lenses Ordered: Boston Equalens II Orthokeratology

OD: +3.72 DS, BC:9.60, OAD:11.9mm, OZ: 6mm, Freeform, Red

OS: +1.68 DS, BC:9.52, OAD:11.9mm, OZ: 6mm, Freeform, Blue

Pre-Treatment Exam Data

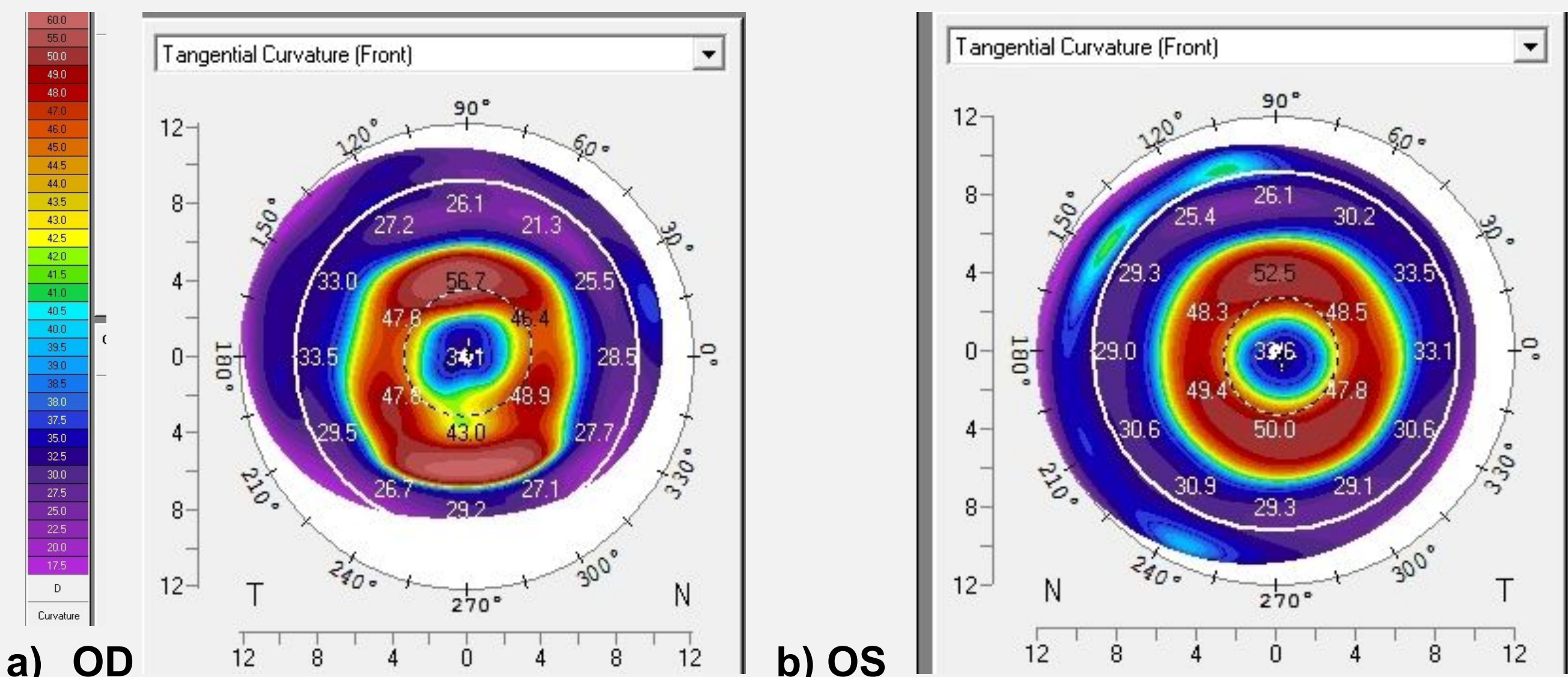
	OD	OS
Subjective Refraction	-5.75-1.75x015, 20/20	-5.25-1.75x180, 20/25
Ks	41.4/ 43.2D@ 095.8	41.7/ 43.6D@ 089.2
ΔK	1.8D	1.9D
Axial Length	26.06mm	26.01mm
Sodium Fluorescein Pattern	Central bull's eye pattern, adequate edge and peripheral clearance 360, adequate movement OU	



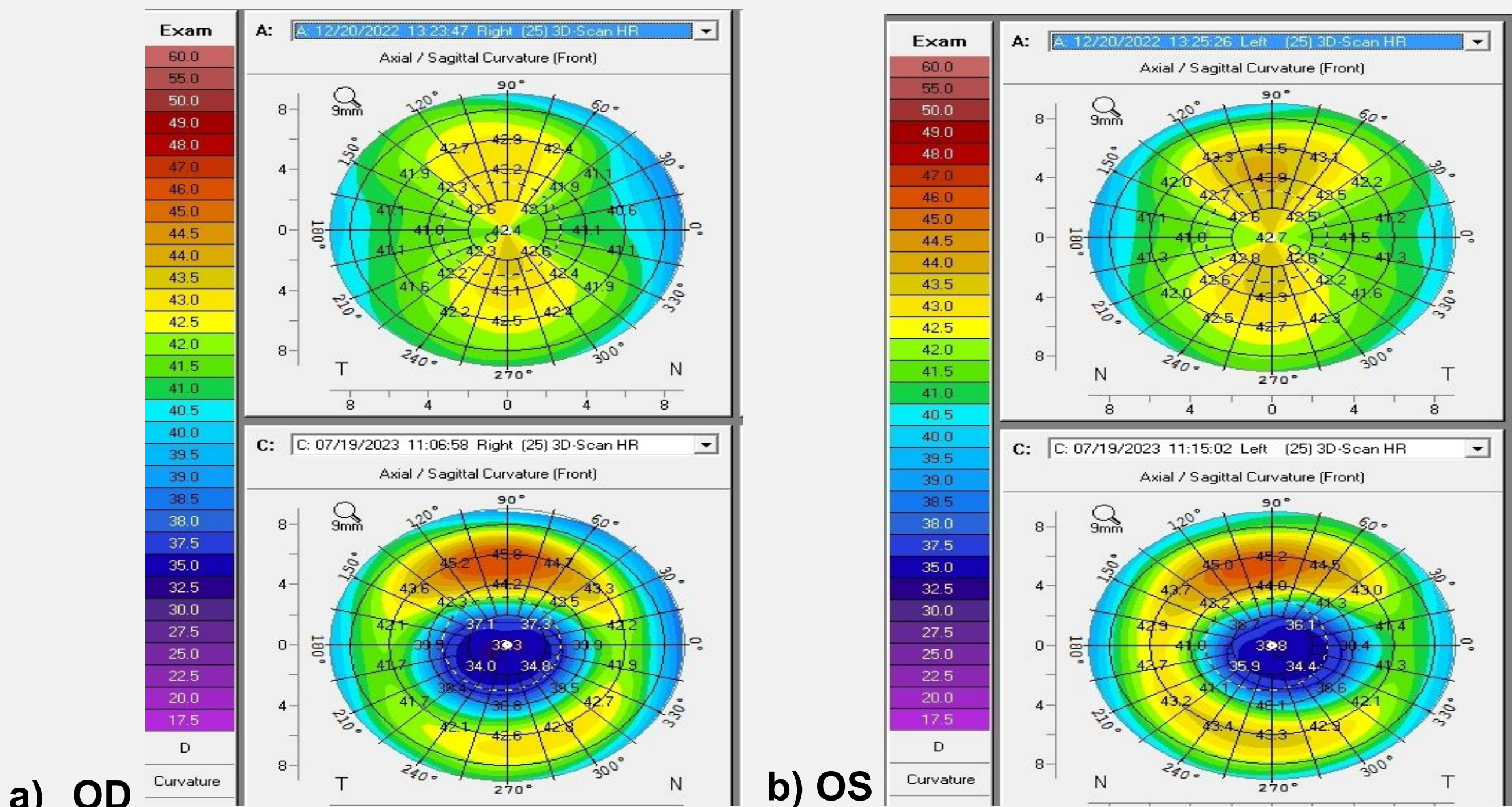
a) OD b) OS
Figure 1: Baseline axial topography maps show regular WTR limbus to limbus astigmatism OU

Post Treatment Exam Findings at 2-month Exam

	OD	OS
Uncorrected VA	20/20 OD, OS	
M1	+0.50-0.50x180	+0.75-0.50x180
Ks	37.1/ 37.5D@ 139.3	37.4/ 38.8D@ 099
Thinnest Location	519 micrometers	520 micrometers
Central Diopter Change	-9.0D	-8.8D
Myopic Defocus Dosage	+6.1D	+5.7D
Axial Length	26.15mm	26.06mm



a) OD b) OS
Figure 2: Tangential topography map shows good bull's eye pattern with centered treatment zone OU with 2 months of continuous nightly wear and 1 lens change



a) OD b) OS
Figure 3: The axial topography maps at the top display regular WTR astigmatism at baseline exam pre-treatment. The axial topography maps on the bottom reveal significant central flattening with 2 months of continuous nightly wear and 1 lens change

Discussion

After about 2 months of continuous nightly wear and one lens change (manufacture error), the patient achieved good vision and appropriate refractive error goal of +0.50D with some residual astigmatism as displayed in the post-treatment exam findings. The axial topography maps at the bottom of Figure 3 reveal significant central flattening at the 2-month follow up exam, showcasing effective OK treatment.

OK lenses allow for temporary reduction in myopia by reshaping the cornea during nightly wear.¹ The typical reverse geometry design allows for flattening of the central cornea and steeping of the mid-peripheral cornea resulting in the bull's eye ring pattern seen on topography (Figure 2a and 2b) and also seen on lens evaluation with sodium fluorescein.^{2,4} Patients with high corneal toricity have shown greater success with toric or custom fit OK lenses, as displayed in this case, because they take into account peripheral toricity and allow for better centration and, therefore, treatment effect.^{2,5} Although the patient in this case showcased more than 6D of central flattening, which is beyond the FDA approved amount, there is not enough research currently to determine whether the risk outweighs the benefit.^{6,7} The patient is being followed closely every 3 months with corneal topography (included posterior float) and thorough corneal exam.

Conclusion

OK lenses have become a popular option for myopia management as they allow for the temporary reduction of myopia during the day.¹ OK is a potential option for myopia control even in patients with higher than indicated refractive errors, or flatter than average pretreatment Ks. Customizable OK lenses allow for a unique lens design specific to that patient's corneal shape.² Patients need to be educated of the potential risks involved with flattening beyond the FDA recommendation of 6 D. These patients must be followed closely.

References:

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