

Post-LASIK Ortho-K Fitting: Flattening An Oblate Cornea

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Introduction

- 9.4% of post-LASIK patients do not see 20/20 five years after surgery.¹
- Enhancement surgery can be considered but poses increased risks for epithelial ingrowth, ectasia, corneal haze, etc.²
- Ortho-k lenses are a corrective option for residual myopia in the post-surgical oblate cornea.

Case Report

A 27 year-old Asian female presented for Ortho-k fitting to correct residual myopia post-LASIK. She prefers uncorrected daytime vision and finds mild discomfort in soft contact lenses.

Ocular History:

- LASIK 2016 OU (previously -3.25DS OU)
- Myopic progression of -0.25 OU per year since graduate school
- History of wearing ortho-k & soft contact lenses

Medical History:

- Eczema, environmental & pet allergies

Discussion

Ortho-k is a viable option for post-LASIK patients with low residual myopia. The design of the lens parameters can be either based on the patients' original corneal topography if available, or the post-LASIK map, combined with careful diagnostic fitting evaluation.

Ortho-k Fitting Methodology:

The BCs of the lenses were calculated based on the K_0 and targeted myopia correction, minus the Jessen/compression factor. The selection of RZD/RC of the lenses took into account the amount of sagittal depth change necessary to return the lens from the BC to the mid-peripheral cornea to allow a ideal tangent landing. The LZAs/ACs of the lenses were chosen based on the K readings at the 8-9mm chord length.

In this case, a custom VST lens design provided better centration over the post-LASIK oblate cornea due to its aspheric base curve, multiple alignment curves that contrasted the tangent landing design in the CRT lenses, which were more impacted by the upper lid traction hence superior decentration, especially after overnight wear.

Lens Parameters		BC	Dia	OZD	Power	Additional Curves
CRT Dual Axis	OU	8.40	11.0	6.0	+0.50	RZD: 525/550, LZA: 33/34
Custom VST	OD	8.28	10.8	5.0	+1.00	P3: 7.85 (0.7), P4: 9.40 (0.3), P5:12.5 (0.2)
	OS	8.28	10.8	5.0	+1.00	P3: 7.90 (0.7), P4: 9.45 (0.3), P5:12.5 (0.2)

Clinical Pearls

- LASIK flaps are most commonly centered over the pupil, which is slightly superior nasal to the corneal geometric center.³ While Ortho-k lenses are centered over the cornea to allow uniform weight bearing on the corneal epithelium for best long-term safety. Careful interpretation of topographical images are critical in understanding the clinical impact of such discrepancy.
- It is not uncommon for the auto-refraction over Ortho-k lenses, especially in Dual Axis or toric designs, to manifest mild ATR astigmatism due to asymmetrically induced tear lens effect in each meridian. The induced ATR cylinder over the lenses does not predict the induced cylinder after lens removal.
- As little as 2 hours of lens wear can fully correct daytime vision in low residual myopia in post-LASIK patients. The wearing schedule can be customized to meet the visual needs of the patients to provide various amount of "add powers".

References

1. Schallhorn SC, Venter JA, Teenan D, Hannan SJ, Hettinger KA, Pelouskova M, Schallhorn JM. Patient-reported outcomes 5 years after laser in situ keratomileusis. J Cataract Refract Surg. 2016 Jun;42(6):879-89
2. Walter Bethke, M. E. (2014, October 6). How to approach LASIK enhancements. Review of Ophthalmology. Retrieved November 19, 2021, from <https://www.reviewofophthalmology.com/article/how-to-approach-lasik-enhancements>.
3. Moshirfar M, Hoggan RN, Muthappan V. Angle Kappa and its importance in refractive surgery. Oman J Ophthalmol. 2013;6(3):151-158. doi:10.4103/0974-620X.122268

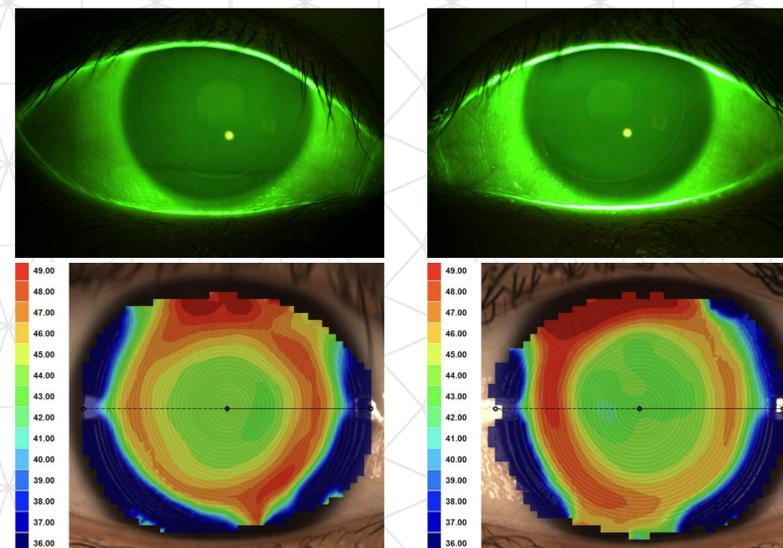
Ortho-k Fitting Process

The patient was first fitted with CRT Dual Axis designs OU, which presented with mild superior temporal decentration OU that was not improved by either increasing the vertical RZD or overall diameter. With first overnight wear of the lenses, the superior temporal decentration was further worsened with moderate irritation from lenses.

Custom VST lenses were then attempted after a complete washout, which presented with good centration OD, trace temporal decentration and slightly excess movement OS, but otherwise dispensable for overnight wear.

At 1 day and 1 week follow-up, the lenses presented with ideal centration, reasonable movement, and good acuity OU.

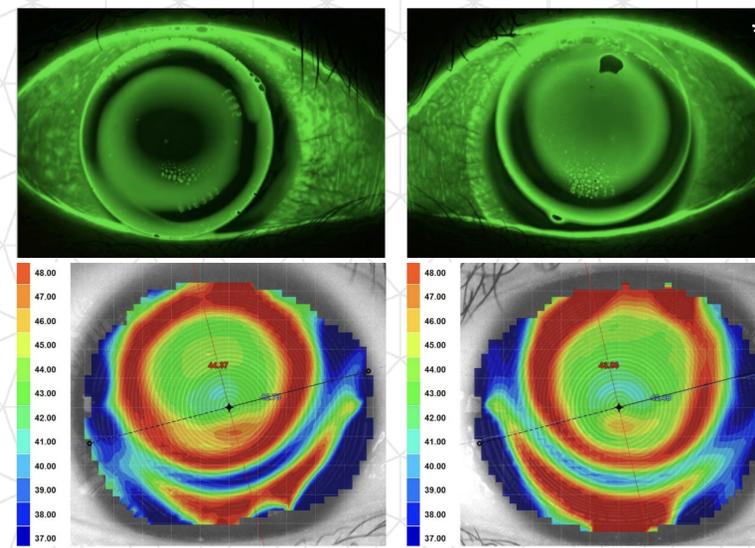
Baseline: Post-LASIK



Baseline Refractive Data					
	VA sc	VA cc	Manifest Refract.	Keratometry	WTW
OD	20/40 ⁻²	20/15	-1.00 -0.50 x 170	42.87/44.25 @ 077	11.6
OS	20/40 ⁻²	20/15	-0.75 -0.75 x 009	42.25/43.50 @ 095	11.5

Eval: Well-healed LASIK flap, mild papillary conjunctivitis OU

Fitting 1: CRT Dual Axis

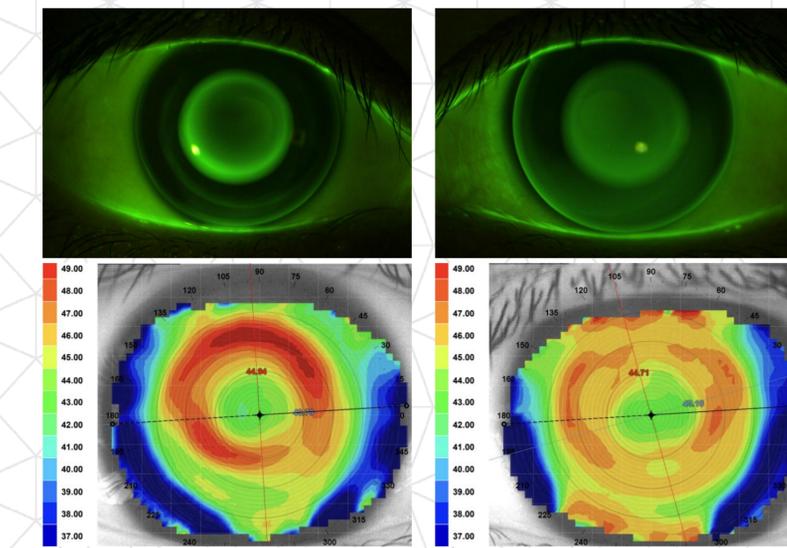


1 Day Follow-Up				
	VA sc	VA cc	AR over Lens	Manifest Ref.
OD	20/15	20/15 ⁻²	-0.25 -0.50 x 092	-
OS	20/15	20/15 ⁻¹	+0.75 -1.00 x 100	-

Eval: Moderate superior temporal decentration, dimple veiling OU

*Initial in-office trial lenses available, modified trials had similar appearance

Fitting 2: Custom VST



1 Week Follow-Up				
	VA sc	VA cc	AR over Lens	Manifest Ref.
OD	20/20 ⁺¹	20/15	+1.00 -0.50 x 079	-0.25 -0.75 x 020
OS	20/15 ⁻²	20/15	+0.50 -1.00 x 100	-0.50 -0.25 x 015

Eval: Adequate centration, small treatment zone OU