

Contact Lenses after Sutureless Inter-Lamellar Keratoplasty

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Introduction

Surgical intervention is indicated when patients with keratoconus demonstrate progressive apical thinning, steepening of the cornea, and/or large refractive changes.¹ While corneal crosslinking (CXL) remains the current standard to reduce progression, Sutureless Inter-Lamellar Keratoplasty (SILK) can be an alternative for those that are not good candidates for CXL. SILK is a novel procedure, recently piloted at OHSU - Casey Eye Institute, which aims to prevent progression of keratoconus. The procedure uses a crescent blade guided by an intraoperative anterior segment OCT to make a lamellar pocket at about 75% depth in the deep corneal stroma. A Halo® donor graft, an electron-beam sterilized acellular anterior corneal allograft containing Bowman’s membrane and anterior stroma, is placed in the pocket to strengthen and stabilize the cornea.

Case Description

A 39 YO male with progressive keratoconus underwent SILK of the right eye seven months prior. Patient noticed a decrease in vision and comfort wearing pre-op scleral lenses. The surgeon referred the patient for a re-fit of the contact lens, as the procedure had induced structural and refractive changes in the cornea.

OD	Pre-op	Post-op (3 mo)
Visual Acuity	20/25 cc	20/50-1 cc
Cornea	Iron line, Vogt’s striae, apical sub-epi haze, small stromal opacity inferior to visual axis	Interlamellar Halo graft in place, iron line, Vogt’s striae, apical sub-epi haze
Km	57.1 D	57.7 D
Kmax	70.4 D	66.2 D
Thinnest Pachy	356 um	468 um
Eccentricity (8mm)	1.45	1.17
HVID	11.8mm	11.8mm

Table 1. Comparing pertinent findings pre-op and post-op

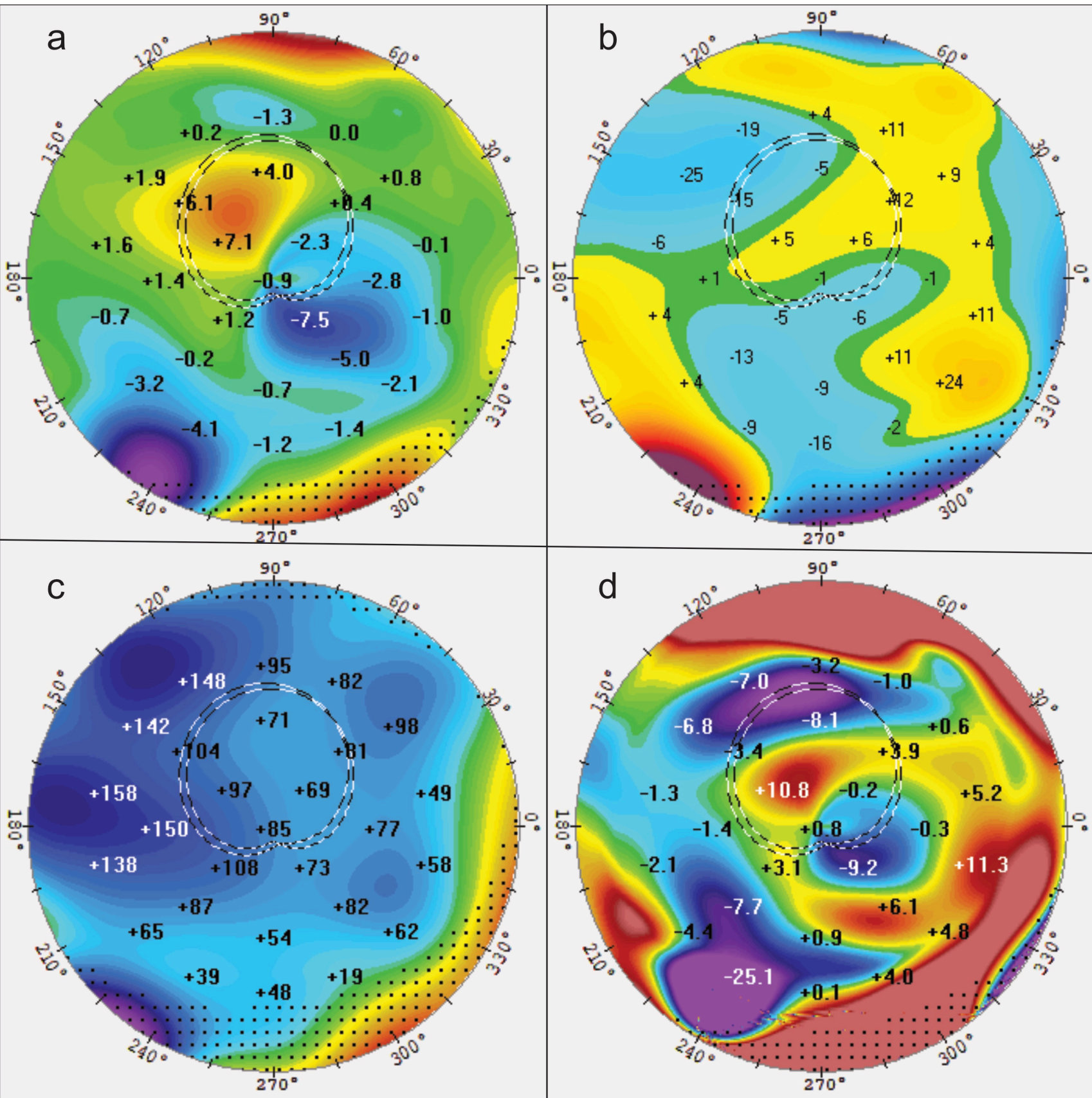


Figure 1. Difference maps comparing pre-op vs 3mo post-op (a) Axial, (b) Anterior Elevation, (c) Corneal Thickness, and (d) Tangential Curvature.

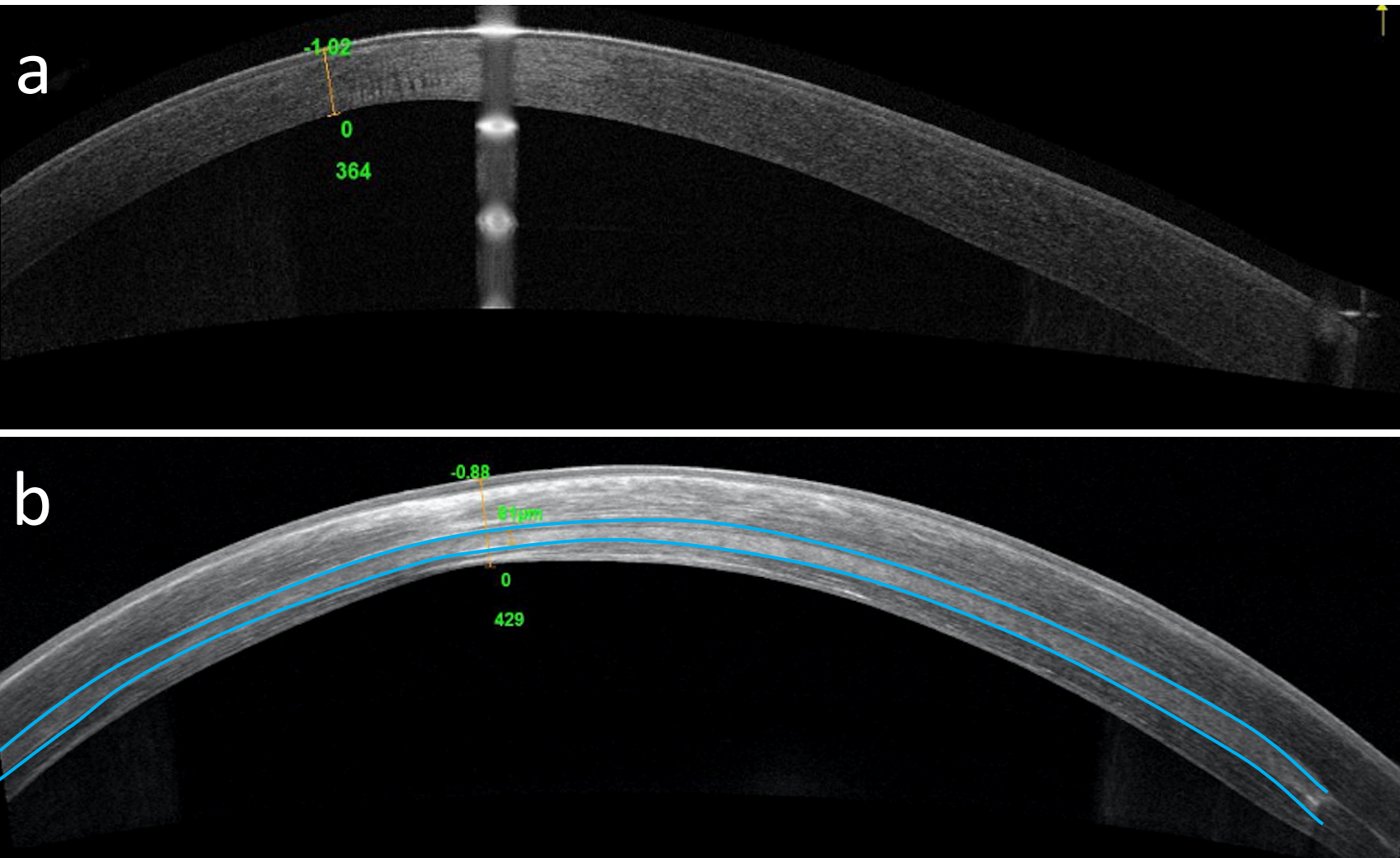


Figure 2. Comparing anterior segment OCT images of the cornea (a) pre-op and (b) 3 months post-op. The graft measured 81um in thickness.

Pre-op Lens									
	Manufacturer	Lens	Bc	RX	OAD	CCZ	Lite	SLZ	Material
OD	Valley Contax	CS Elite	45.50	-3.50	16.8	std	+3	0/-2	Infinite
OS	Valley Contax	CS Elite	43.50	-2.50	16.8	-0.5	+3	0/-3	Infinite
Post-op Lens									
	Manufacturer	Lens	Bc	RX	OAD	CCZ	Lite	SLZ	Material
OD	Valley Contax	CS Elite	47.50	-5.00	17.8	+1	+6	+2/-9	Infinite
OS	Valley Contax	CS Elite	43.50	-2.50	16.8	-0.5	+3	0/-3	Infinite

Table 2. Finalized scleral contact lens parameters pre-op vs post-op.

Conclusions

Procedures to prevent or limit progression of keratoconus can change corneal shape, requiring a refit of contact lenses. Typically, with post-CXL the cornea tends to flatten.² In this case with SILK, the patient needed a significant increase in the contact lens sagittal height, from 5354um (pre-op) to 6122um (post-op), to appropriately vault over the cornea. Corneal sagittal height is theoretically calculated using corneal diameter, eccentricity, and radius of curvature. In this case, corneal diameter remained constant, radius of curvature remained consistent (Km), and eccentricity shifted towards a flatter approach, so theoretically a higher sagittal height is not predicted. However, with abnormal eyes, such as keratoconus, theoretical calculations are not plausible and relying on Pentacam (Oculus, Wetzlar, Germany) has been shown to be undependable.³ The topographical difference maps, indicate no clear explanations for why increased sagittal height was needed. There may be key missing peripheral data from the standard Pentacam 8mm chord map. The graft is 9.5mm in diameter with a meniscus shape that causes a bulge in the peripheral cornea possibly influencing the sagittal height. Further investigation with irregular corneas is warranted with other technologies such as wide field anterior segment OCT. Novel procedures require close communication between surgeon and contact lens provider to ensure careful monitoring of corneal changes that may affect the patient’s vision and contact lens fit.

References

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