



Early Scleral Contact Lens Fitting Post-Corneal Crosslinking

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Introduction

Corneal collagen crosslinking (CXL) halts the progression of corneal ectasia, especially in keratoconus. The FDA-approved version of CXL, “epi-off”, requires the formation of a 9 mm corneal epithelial defect that typically resolves in less than 1 week. Historically, specialty lens fitting has often been delayed for multiple months after crosslinking to allow for sufficient corneal healing. More recently, the use of scleral lenses (SL) has allowed for earlier specialty lens fitting following CXL. Contact lenses (CL) are often necessary for full visual rehabilitation post-CXL, so earlier fitting may enhance a patient’s post-operative quality of life. This case demonstrates that starting a SL fitting, as early as 2 weeks post-CXL, may be beneficial.

Background

A 43-year-old female presented for a SL fitting 6 weeks post-CXL OD and 2 weeks OS. She had a history of moderate, progressive corneal ectasia post-LASIK OU. Due to stringent visual demands at her workplace, she requested to initiate SL fitting *prior* to the recommended one month post-CXL OS.

Case Details

Exam (SL fitting 6 weeks post-CXL OD, 2 weeks post-CXL OS):

- Snellen VA sc: 20/200 OD (PH: 20/40), 20/400 OS (PH: 20/40)
- SLE: 1+ diffuse corneal haze and punctate epithelial erosions OU
- Pentacam: Decentered inferior ectasia OU (*see Figure 4*).
- Diagnostically fit with Valley Contax Custom Stable Elite Prolate SLs OU

Final lens parameters (9 weeks OD, 5 weeks OS post-CXL):

Eye	Brand	Power	BC/Dia	SAG	Haptics (SLZ)
OD VA: 20/20	Valley Contax Custom Stable Elite Prolate	-12.25DS	7.03mm/15.8mm	4770	-3/-13
OS VA: 20/20		-11.50 DS	7.03mm/15.8mm	4822	Q1 & Q3: +1, Q2: -9 Q4: -11

7 month follow up: VAcc (Habitual SLs): 20/20 OD, OS, OU.

- The patient reported great comfort and vision with habitual lenses.
- SLs: Good fit, and no modifications were indicated at this time OU.
- Pentacam: Inferior ectasia OU with no clinically significant progression between the initial post-op and 7 month scans (*see Figures 2-4*).

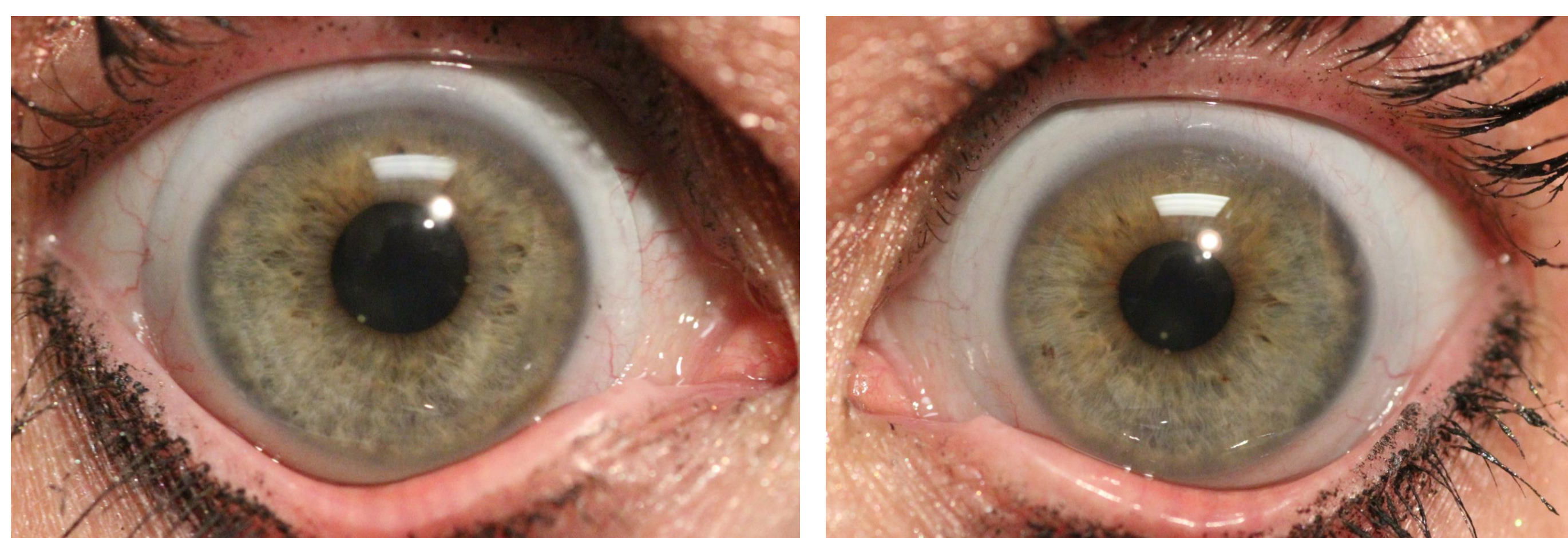


Figure 1: Photo of finalized scleral lenses OD (*left*), OS (*right*) taken **7 months post-CXL**.

Pentacam Corneal Tomography

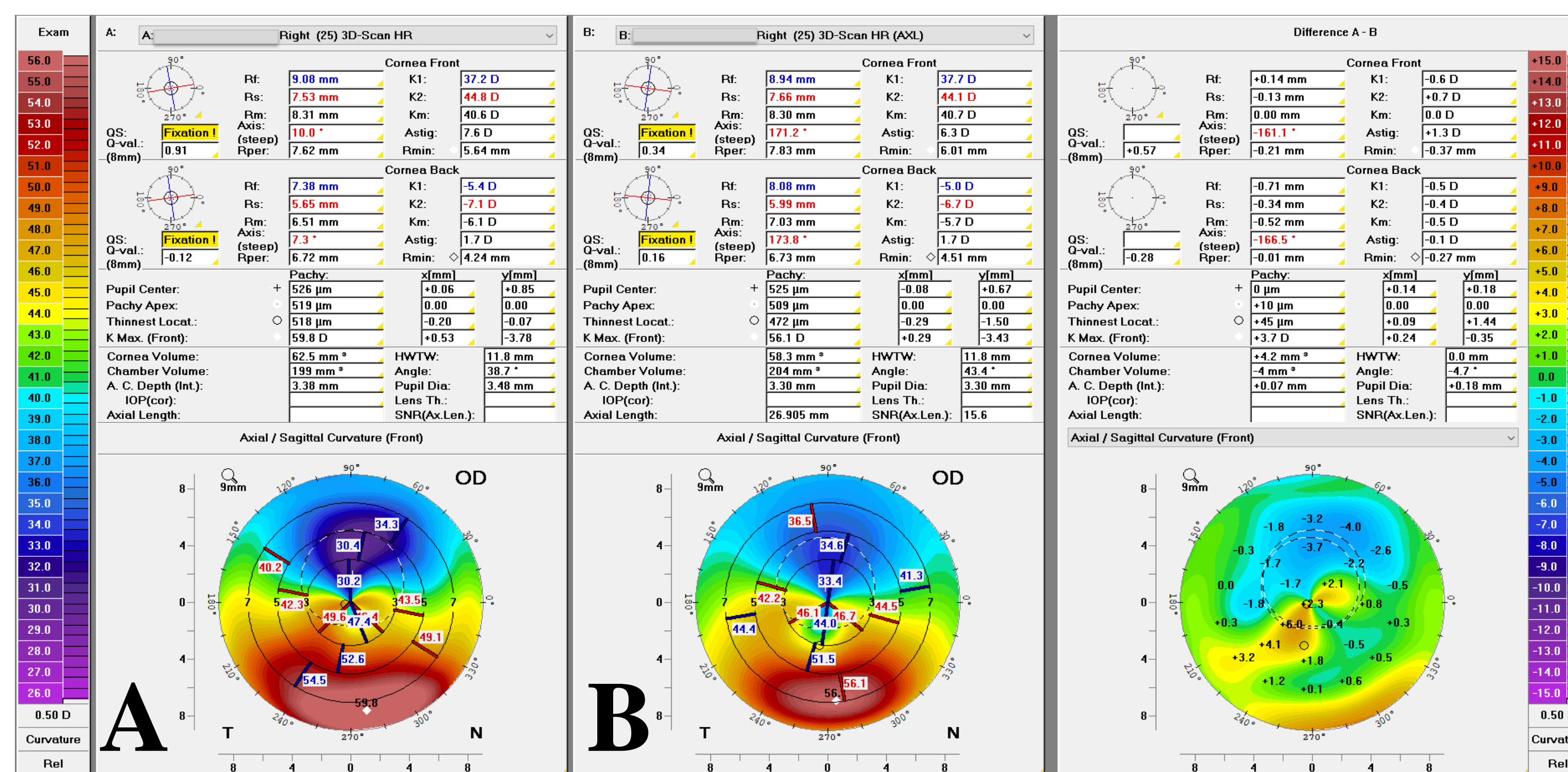


Figure 2: Compare 2 Maps Axial Analysis showing progressive inferior ectasia OD when comparing the pre-CXL scan (B) to the 7 months post-CXL measurement (A). Pre-CXL scan was taken 6 months prior to CXL.

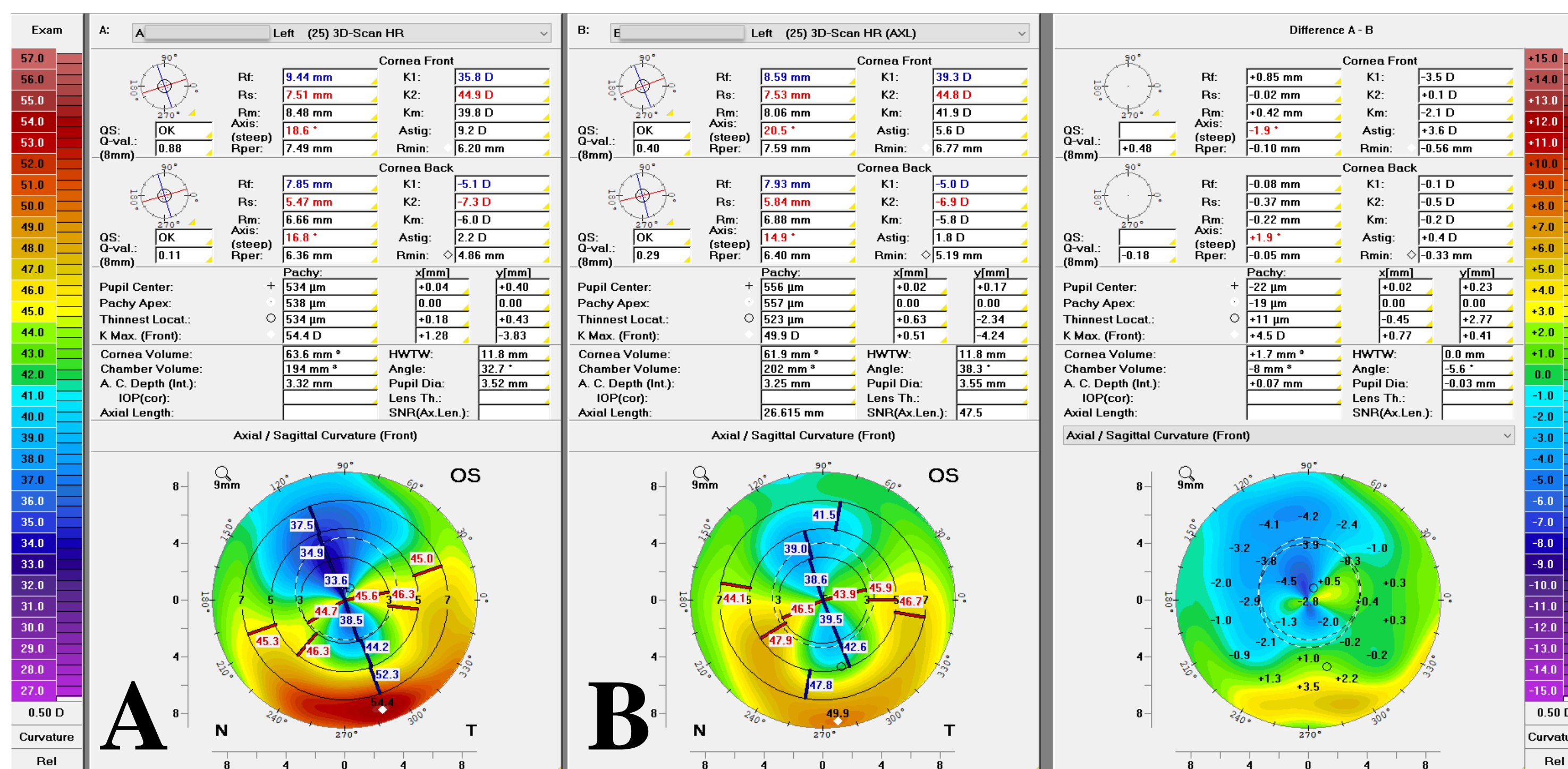


Figure 3: Compare 2 Maps Axial Analysis showing progressive inferior ectasia OS when comparing the pre-CXL scan (B) to the 7 months post-CXL measurement (A). Pre-CXL scan was taken 6 months prior to CXL.

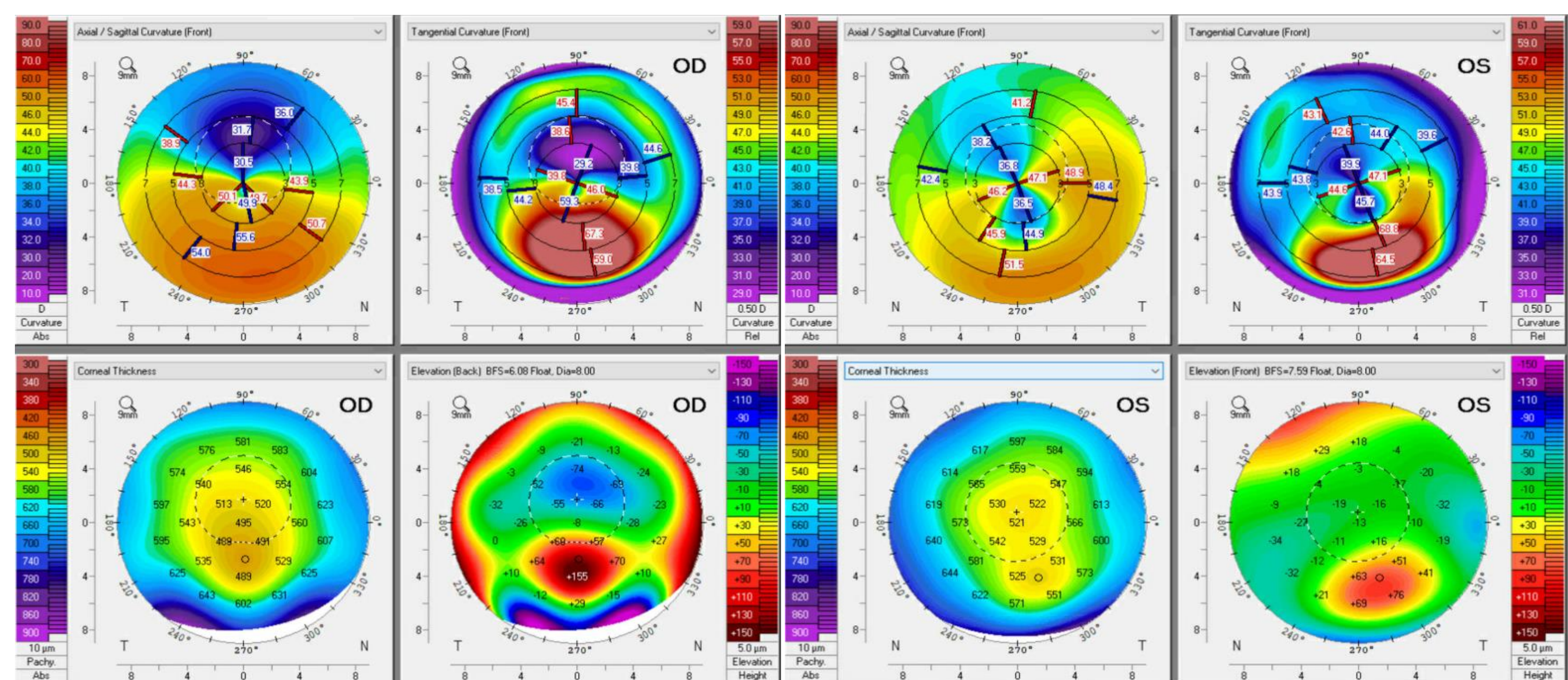


Figure 4: 4 Maps Selectable Analysis showing an increase in Kmax and back surface elevation of OD **6 weeks** (*left*), OS **2 weeks** (*right*) post-CXL from pre-CXL scans. No clinically significant difference from 7 month post-CXL scans OU.

Discussion

In this case, by starting the SL fitting as soon as the epithelium was closed, the patient was able regain her full visual potential sooner than if the common fitting pattern had been followed. SLs advantageously vault over the cornea, which reduces risk of mechanical stress to the post-operative corneal epithelium. Research on the changes in scleral shape after CXL is limited, so edge alignment should also be closely monitored for the first year post-CXL.

A comparison of the axial maps (*see Figures 2-4*) appears to show post-CXL progression. However, when comparing the maximum keratometry values (Kmax), we have to consider that there was likely progression between the 6 month pre-op scan and CXL rather than progression after CXL. There are few studies assessing the occurrence of progression of post-LASIK ectasia post-CXL, but they all show low occurrence.¹⁻⁴ One study that evaluated the progression of keratoconus (KCN) post-CXL with pre-operative Kmax values of $\geq 58D$ demonstrated a larger incidence of post-CXL progression.⁵ While this patient is not keratoconic, it may be worth considering that her very high pre-CXL Kmax (*see Figures 2B & 3B*) could put her at higher risk for post-CXL progression. However, between the 2-6 weeks post-CXL scans and 7 month post-CXL scans, there does not appear to be any statistically significant progression.

Clinical Pearls

- When deciding how soon to fit a patient into SLs after CXL, consider visual needs and work requirements. Some may not be able to wait a full month, or longer, before achieving some visual rehabilitation.
- Scleral lenses have a significant advantage over corneal gas permeable and hybrid contact lenses as they can vault over the fragile post-op corneal surface, allowing for earlier fitting.
- Monitor patients closely for progression after CXL. While progression is not common, it may warrant re-treatment.
- It is important to educate patients that due to post-op changes in the cornea and sclera, more frequent contact lens modifications may be needed in the first year post-CXL.

Conclusion

Although corneal shape has been reported to change for at least 12 months post-CXL, initiating a SL fit soon after CXL may improve visual function in cases of severe ectasia without hindering post-op CXL corneal healing. It is our recommendation to wait at least until the corneal epithelium has completely healed before starting a SL fitting post-CXL. Patients should be properly educated that additional CL modifications may be needed more frequently for up to a year after CXL. Each practitioner should weigh the benefit of early visual rehabilitation with the risk of modifications when deciding how soon to initiate a SL fitting post-CXL.

References

1. Vinigeru P, Camesasca PL, Albe E, Truza S. Corneal collagen cross-linking for ectasia after excimer laser refractive surgery: 1-year results. *J Refract Surg* 2009; 22:1-12.
2. Streltsov E, Vukobratovic E, Michalova L, et al. The effectiveness of corneal cross-linking in stopping the progression of keratoconus. *Czech J Ophthalmol*. 2014;70(6):218-222.
3. Li Q, Fan ZJ, Peng XJ. Corneal collagen crosslinking for corneal ectasia of post-LASIK: one-year results. *Int J Ophthalmol*. 2012;5(2):190-195.
4. Sharif W, Ali ZR, Sharif K. Long term efficacy and stability of corneal collagen cross linking for post-LASIK ectasia: an average of 80 months follow-up. *Int J Ophthalmol*. 2019;12(2):333-337.
5. Kuechler SJ, Tappeiner, C, Epstein, D, Frueh, BE. Keratoconus Progression After Corneal Cross-Linking in Eyes With Preoperative Maximum Keratometry Values of 58 Diopters and Steeper. *Cornea*. 2018. 37(11): 1444-1448