Ocular Sagittal Height as a Better Predictor of Scleral Lens Sagittal Depth than Keratometry in a Case of Post-LASIK Ectasia

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Introduction

Post-LASIK ectasia can cause irregular astigmatism that decreases spectacle best-corrected visual acuity (BCVA). Rigid contact lenses, including gas-permeable and scleral lenses (SL), often provide better vision for patients.[1]

In a diagnostic fit, the initial SL is often selected based on keratometry (K) values, with steeper Ks indicating a deeper sagittal depth. However, K values alone may not allow for accurate diagnostic SL selection in an ectatic cornea.

Case Report

A 49-year-old systemically healthy White male was referred for contact lens fit for post-LASIK ectasia OD>OS. He had LASIK OU about 25 years ago and started habitually wearing spectacle correction one month ago. He has no prior history of contact lens wear.

Incoming spectacle VA was 20/400 OD PH NI, 20/25 OS PH 20/20. Slit lamp exam revealed clear central corneas with LASIK flap scars OU. Slit lamp exam, pachymetry, and AS-OCT demonstrated central corneal steepening and thinning OD.

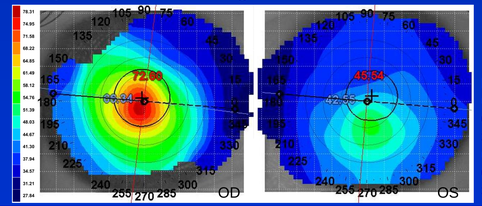

Figure 1. Topographies OU
OD Ks 66.34D@173/72.60D@083
Corneal astigmatism 6.26D
Spectacle Rx +0.75-4.25x073
OS Ks 42.55D@175/45.54D@085
Corneal astigmatism 2.99D
Spectacle Rx -0.50-2.50x097

Post-LASIK Ectasia

- Loss of biomechanical strength leading to progressing myopia or astigmatism, corneal steepening, and corneal thinning[1]
- Risk factors include abnormal topography, multiple procedures, high myopia, thin corneas, and thin residual stromal bed[2-4]
- Surgical management includes intracorneal ring segments, corneal cross-linking, and PKP or DALK[1,3]
- Tomography may provide additional data for ectasia risk assessment, especially in conjunction with AI.[3,4]

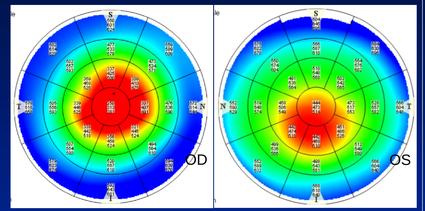

Figure 2. Pachymetry demonstrates corneal thinning OD. Central corneal thickness 313µm OD, 473µm OS. Minimum thickness 250µm OD, 444µm OS.

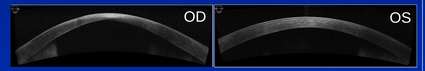

Figure 3. AS-OCT shows thinning and hyperreflectivity of the central stroma OD.

Contact Lens Management

AS-OCT demonstrated ocular sag at a 15.0mm chord was 3900µm OD. Despite presenting with steep corneal curvatures, a 16.5mm diagnostic scleral lens with a 4200 sag provided appropriate apical clearance of 300µm. Over-refraction of pl-2.50x150 improved vision to 20/20.

Patient elected to continue spectacle correction OS.

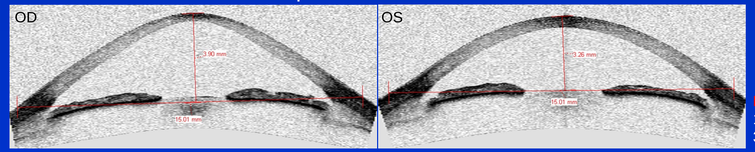

Figure 4. Ocular sag at a 15.0mm chord was 3900µm OD, 3260µm OS

Final Scleral Lens

OD: SL/8.04/-3.50-2.25x001/16.5/4200 sag/100µm toric haptic/Dk 100
VA: 20/20

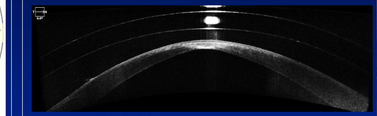

Figure 5. AS-OCT demonstrating scleral lens clearance OD post-settling.

Figure 6. Final scleral lens OD.

Conclusion

In this case of post-LASIK ectasia, the steep K of 72.60D OD suggests that the patient may need a SL of exceptional depth to vault the cornea. However, ocular sag measurement revealed that the patient had sagittal height only slightly greater than the normal eye average of about 3700µm[5], so a SL with average sag was appropriate for the patient. In SL fits for post-surgical ectasia, ocular sag measurements may more accurately predict the appropriate SL sag than Ks.

References

1. Wolle MA, Randleman JB, Woodward MA. Complications of Refractive Surgery: Ectasia After Refractive Surgery. Int Ophthalmol Clin. 2016;56(2):127-39.
2. Bohac M, Koncarevic M, Pasalic A, Biscevic A, Merlak M, Gabric N, Patel S. Incidence and Clinical Characteristics of Post LASIK Ectasia: A Review of over 30,000 LASIK Cases. Semin Ophthalmol. 2018;33(7-8):869-877.
3. Zhao L, Yin Y, Hu T, Du K, Lu Y, Fu Q, Zhang Y, Wu X, Li Y, Wen D. Comprehensive management of post-LASIK ectasia: From prevention to treatment. Acta Ophthalmol. 2023;101(5):485-503.
4. El-Naggar MT, Elkitkat RS, Ziada HE, Esporcatte LPG, Ambrósio R Jr. Assessment of Preoperative Risk Factors for Post-LASIK Ectasia Development. Clin Ophthalmol. 2023 4;17:3705-3715.
5. Rojas Viñuela J, Piñero DP, Martínez MB. Comparing sagittal heights calculated using corneal parameters and those measured with profilometry. Cont Lens Anterior Eye. 2023;46(2):101747.