



# Dysfunction at the Junction: Determining Cause of Fluctuating Vision in a Plus Power Scleral Lens

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## Background

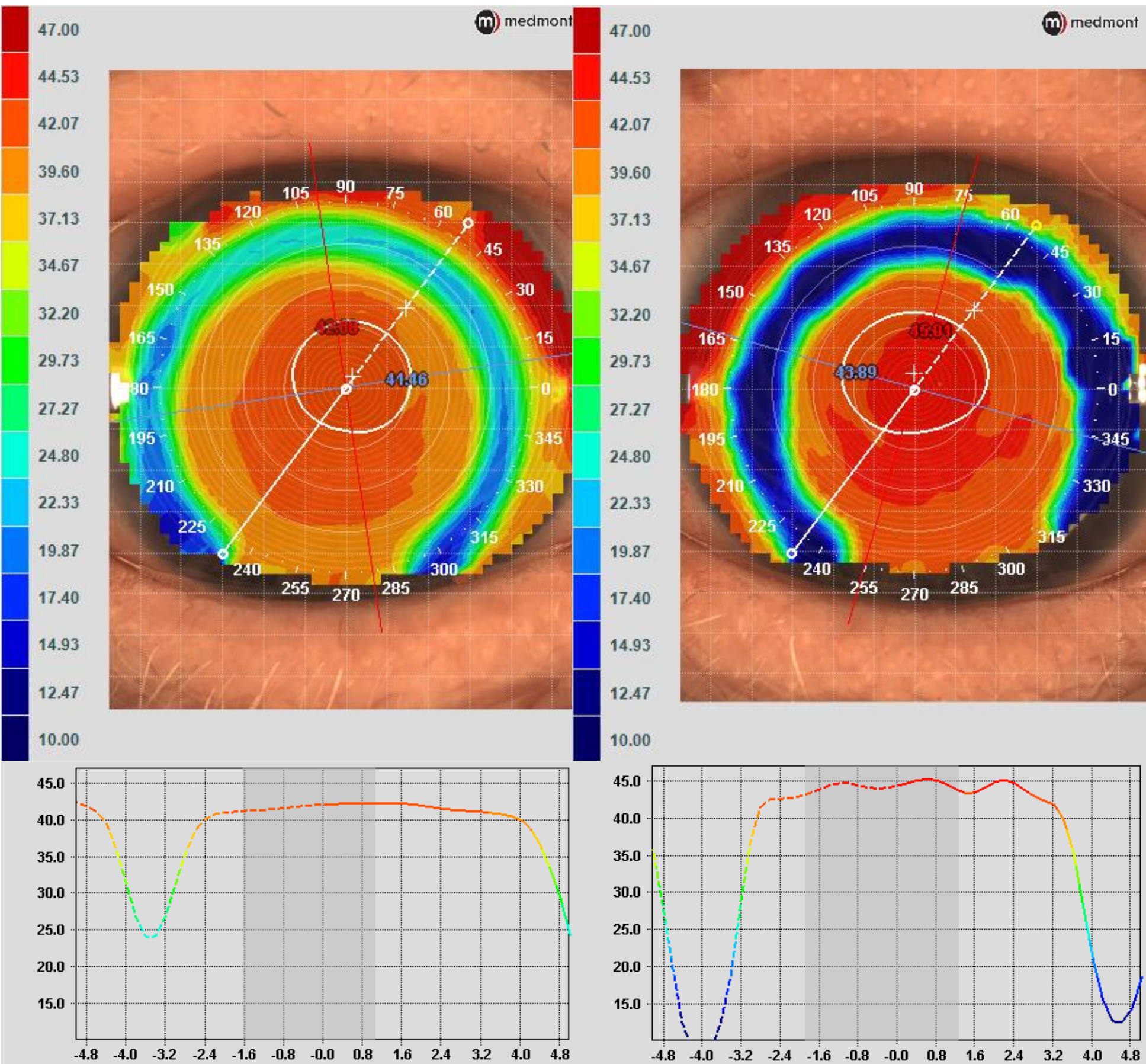
Residual astigmatism in scleral contact lenses has many etiologies. One may consider posterior corneal astigmatism, lenticular astigmatism, toric IOL, warpage or flexure.<sup>1,2</sup> If incorporating toric over-refraction does not improve vision, lens warpage or flexure may be occurring. Flexure in corneal GP lenses has been linked to corneal toricity that is notably different than the base curve of the overlying GP lens. Likewise, in scleral GPs, scleral toricity may induce flexure.<sup>2</sup> If lens fit is ideal, yet residual astigmatism remains, inadequate lens thickness may be the culprit.<sup>2</sup>

## Case Description

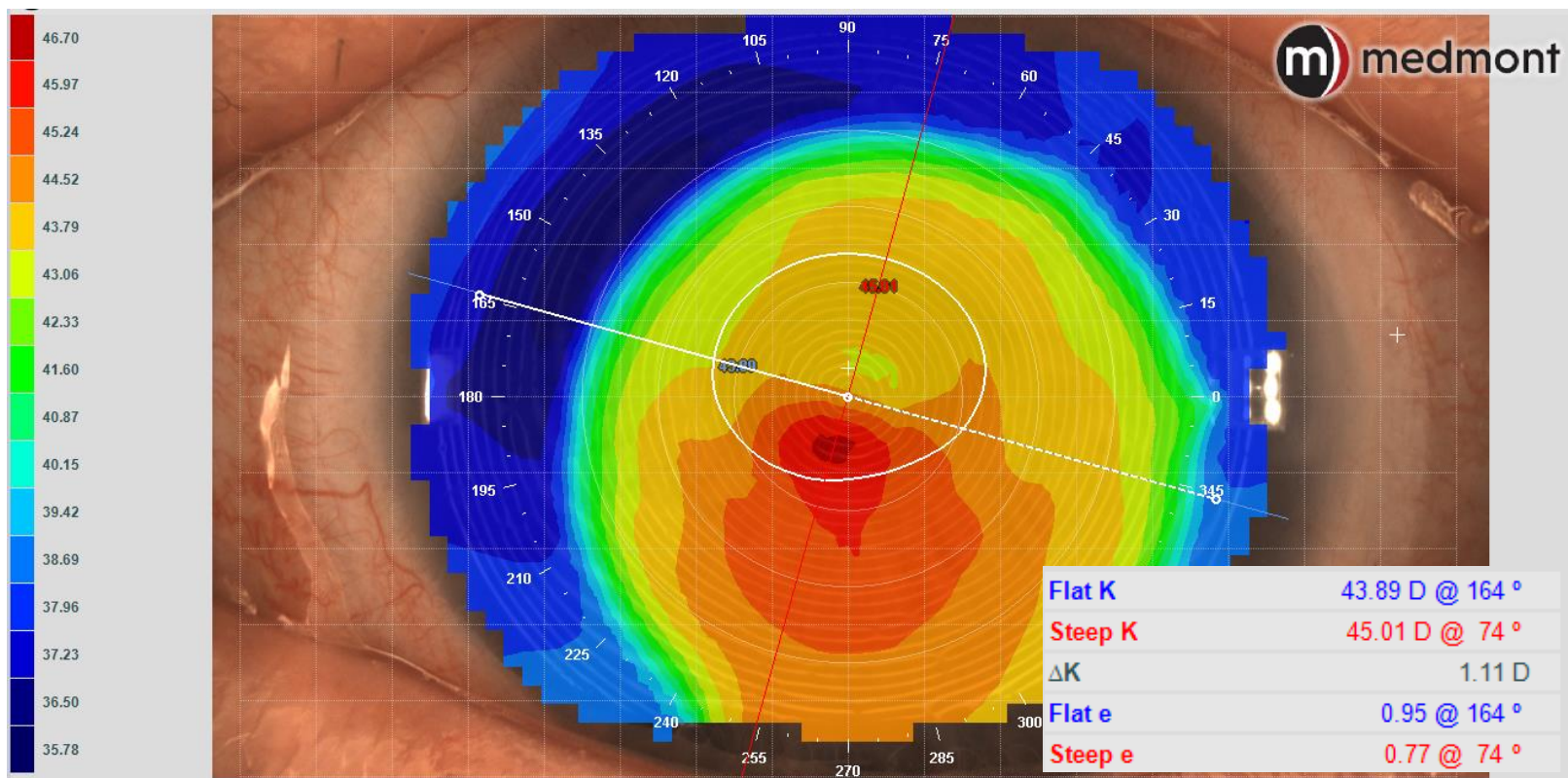
A 56-year-old male with history of scleral lens wear presented for contact lens fit post corneal transplant and cataract surgery OS. The patient has a history of keratoconus OU and corneal transplant OD in 2018. The patient was fit into updated scleral lenses and achieved 20/20 OU with a power change from -5.75 DS to +3.00 DS OS. All other parameters remained the same as lens fit was ideal.

At 3-month follow-up, the patient reported decreased and fluctuating vision OS. Upon evaluation, the lens fit was adequate and the edges were aligned. An over-refraction of +0.50-0.75x165 was obtained to achieve 20/20 OS. Anterior segment evaluation revealed a stable graft and a clear, centered IOL. A new lens was ordered to incorporate over-refraction and shipped to the patient.

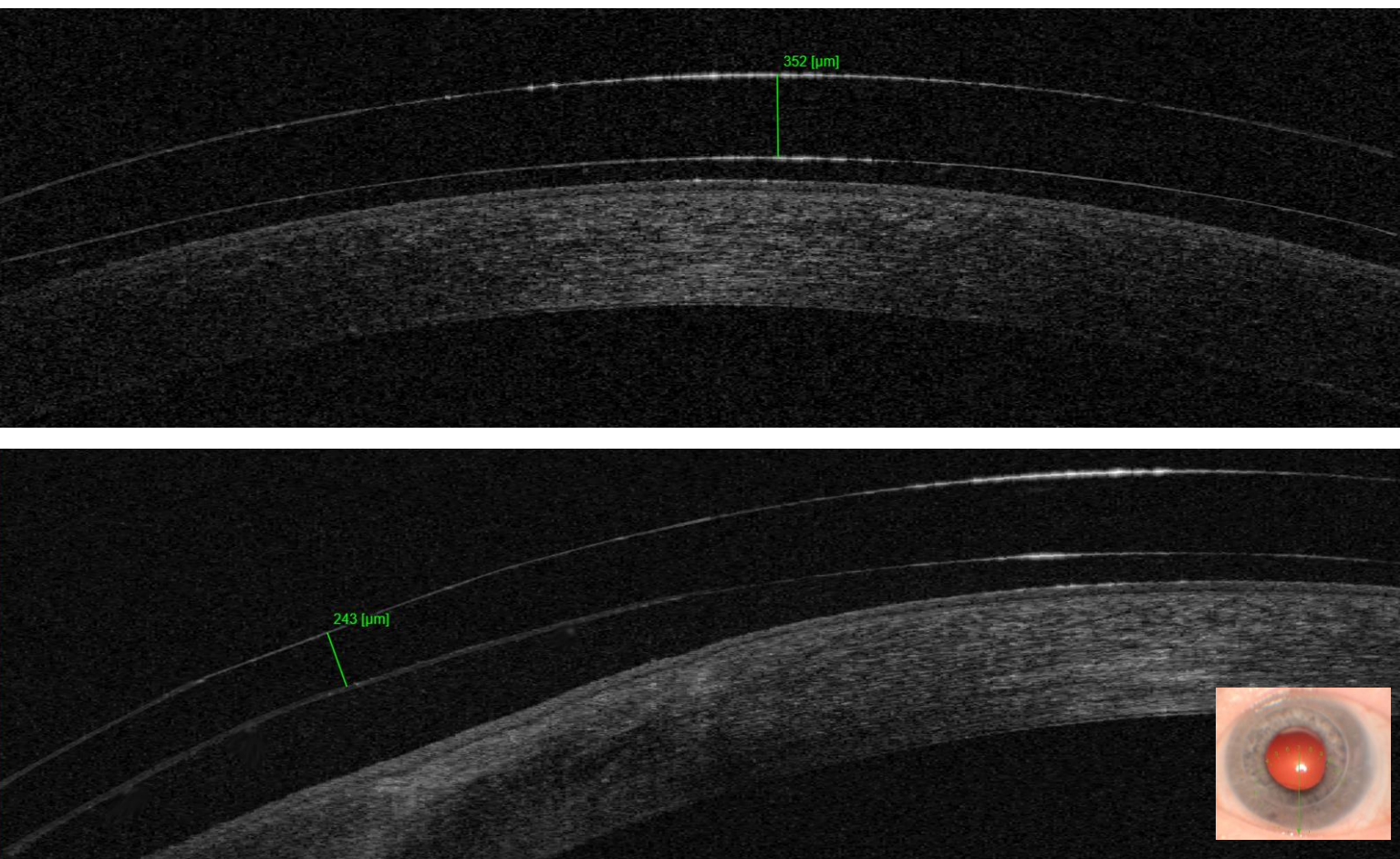
The patient returned 4 weeks later and had resumed wear of his previous left lens stating vision with the new lens was worse than his habitual lens. Topography taken over the habitual lens revealed 1.11D of astigmatism at axis 164 indicating flexure (Figures 1&2). Anterior segment OCT revealed central thickness of the lens was 350um and junctional thickness was 247um (Figure 3).



**Figure 1.** Tangential maps of topography over both right and left lenses. The right lens is -0.50 SPH and the left lens is +3.00 SPH. As seen on the left, the right lens has a relatively smooth spherical surface compared to the left lens that is experiencing flexure. Over topography revealed 1.11D of toricity at axis 164 in the left lens.



**Figure 2.** Axial topography over the left scleral contact lens



**Figure 3.** Anterior segment OCT of left scleral lens with central and junctional thickness of +3.00 SPH scleral lens that is experiencing flexure

## Treatment & Management

Since the patient's over refraction indicated -0.75 diopters of astigmatism at axis 165 and the over topography revealed 1.11D at axis 164, a diagnosis of lens flexure was made. In order to increase junctional thickness, a new left lens with central thickness of 420um was ordered with the original +3.00 power with the goal to reduce flexure. After receiving the new left lens, the patient reported vision was much improved and more stable than his previous lens.

## Discussion & Conclusion

Residual astigmatism in patients with scleral lenses is not uncommon and determining the root cause is helpful when troubleshooting solutions. In this case, an updated scleral lens after transplant had plus power versus minus, and all other fit parameters remained the same. A plus powered lens is thicker centrally and in scleral lenses this may translate into a thinner junctional area. Being cognizant of the impact the power of a scleral lens may have on both central and junctional thickness is helpful when investigating causes of residual astigmatism.

1. Vincent SJ, Fadel D. Optical considerations for scleral contact lenses: A review. Contact Lens & Anterior Eye 2019; 42:598–613.
2. Barness M, Johns LK. Ophthalmology: Current and Future Developments. Contemporary Scleral Lenses: Theory and Application, Volume 4. Sharjah: Bentham Science Publishers; 2017.
3. Shovlin JP. Fighting Flexure. Review of Optometry 2020. Available at: <https://www.reviewofoptometry.com/article/fighting-flexure>. Accessed September 15, 2023

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Lens Parameters					
OD		OS			
Final/Habitual		Before Cataract Surgery	After Cataract Surgery*	Front Toric Change	Final
-0.50 SPH	Power	-5.75 SPH	+3.00 SPH	+3.50-0.75x145	+3.00 SPH
7.85mm	Base Curve	7.85mm	7.85mm	7.85mm	7.85mm
15.8mm	Diameter	15.8mm	15.8mm	15.8mm	15.8mm
0/-3.00	Landing Zone	+2.00/-4.00	+2.00/-4.00	+2.00/-4.00	+2.00/-4.00
Optimum Comfort	Material	Optimum Comfort	Optimum Comfort	Optimum Comfort	Optimum Comfort
0.30mm	Central Thickness	0.30mm	0.35mm	0.35mm	0.42mm
*Lens experiencing flexure					