

You Spin Me Right Round: A toric transition zone provides rotational stability for an FST scleral lens

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Introduction

Incorporating toricity into the transition zone of a scleral contact lens improved the rotational stability, fogging, and comfort for a 55-year old Caucasian male with keratoconus.

Background

The human eye has been shown to have varying levels of toricity of the cornea, limbus, and sclera (1, 2). The degree and direction of toricity does not always correlate between these structures (1, 3), but a 2020 study by Jason Jedlicka and Stephanie Gee found that the cornea's elevation differences may contribute two-thirds of the total sagittal height differences between the primary meridians (5). Research by the Scleral Shape Study Group (SSSG) indicated that one third of subjects had spherical or regular toricity of the sclera and conjunctiva, while two-thirds had irregular patterns (2). The ZenLens Bi-Elevation scleral lens design uses two sagittal height values in the transition zone or vaulting chamber of the lens to better align the lens with a toric limbus (Figure 1)(4).

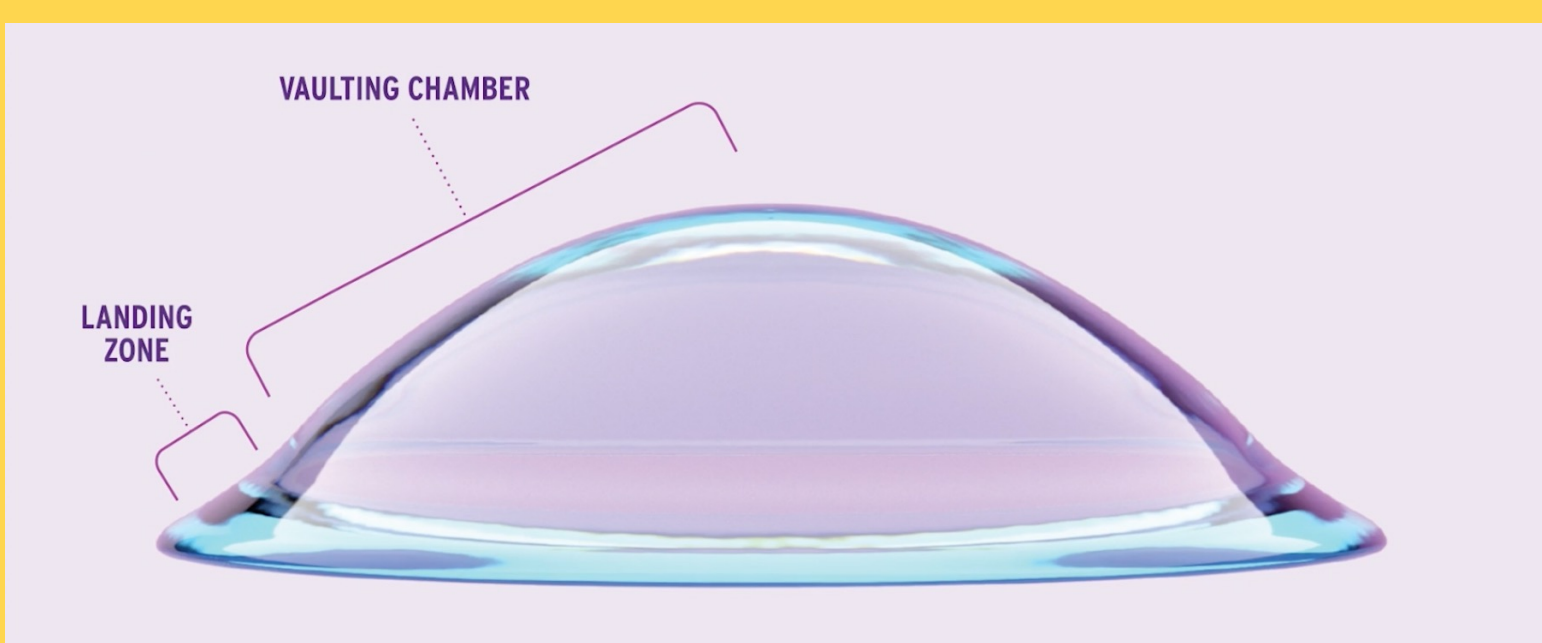


Figure 1: ZenLens Bi-Elevation diagram displaying lens zones

This, in combination with toric or quadrant-specific Advanced Peripheral System (APS) (the landing zone), creates a lens that is able to fit well with the toric sclera (4). Bi-Elevation helps to improve lens decentration, impingement, conjunctival impression rings, and chamber fogging (4). Scleral profilometry can be used to select scleral lenses with appropriate parameters to best align with patient's individual ocular toricity (1).

Case Description

A 55 year-old Caucasian male with keratoconus OU presented for scleral lens re-fitting, requiring front-surface toricity (FST) OD

Chief Complaint: Rotational instability of the lens. Must rotate the lens manually to see clearly.

Secondary Complaint: mid-day fogging, lenses removed and reinserted 1-2 times daily

Ocular History: Keratoconus OU, S/P INTACs OS x2007, wearing OneFit scleral lenses x2016, prior to this used piggyback GP and soft lenses.

Uses Theoloz Duo artificial tears BID OU

Medical History: Acid reflux

Medications: omeprazole

Pertinent Exam Findings:

VA CC specs OD: 20/125, **OS:** 20/40

VA CC CL OD: 20/25-2, **OS:** 20/25-2

Rx: OD: -9.50 -5.00 x135, **OS:** -7.50 -5.00 x040

Anterior Segment: OD: (+) Fleischer ring, (+) Vogt striae, (+) apical scarring, neovasc.

encroaching on cornea ~1mm superior and inferior nasal, pinguecula temporal

OS: INTACs implants in posterior stroma, neovasc. encroaching on cornea ~2mm superior and inferior, pinguecula temporal

Parameter	OD	OS
Diameter	16.0	16.0
B.C.	6.9	7.3
Sag	4800/ 5050	4680/ 5080
Limbus 360	+100	+100
APS – Edge 360	Std	Steep 1
Sphere	-10.00	-8.75
Cylinder	-1.00	--
Axis	155	--

Figure 2: Final scleral lens parameters

Discussion

This patient was refit from a different scleral contact lens as the lens was not rotationally stable despite multiple adjustments. The prior lens had a toric landing zone, but this was not enough to lock the lens into place. The Eaglet scleral profilometer revealed some difference between the limbal elevation in the horizontal versus the vertical meridians. For the right eye, there was 140um difference at a 12.69mm chord (i.e. the limbus, avg HVID 12.69mm) and 260um at 16mm. For the left eye, there was 120um difference at a 12.67mm chord (i.e. the limbus, avg HVID 12.67mm) and 190um at 16mm. This shows that over half of this patient's toricity is contributed by the cornea and limbus: 53.8% OD and 63.2% OS. The hope was that the lens would lock into place more securely if it were aligned to the toricity of the cornea, limbus, and sclera throughout the majority of the lens as opposed to trying to do this only in the landing zone of the lens. The ZenLens Bi-Elevation design scleral lens was ordered to achieve this fit.

Figures 2-5 show the ensuing lens orders with the ultimate outcomes for this patient: a fit that provides an even landing onto the sclera 360 degrees, minimal fogging, and rotational stability.

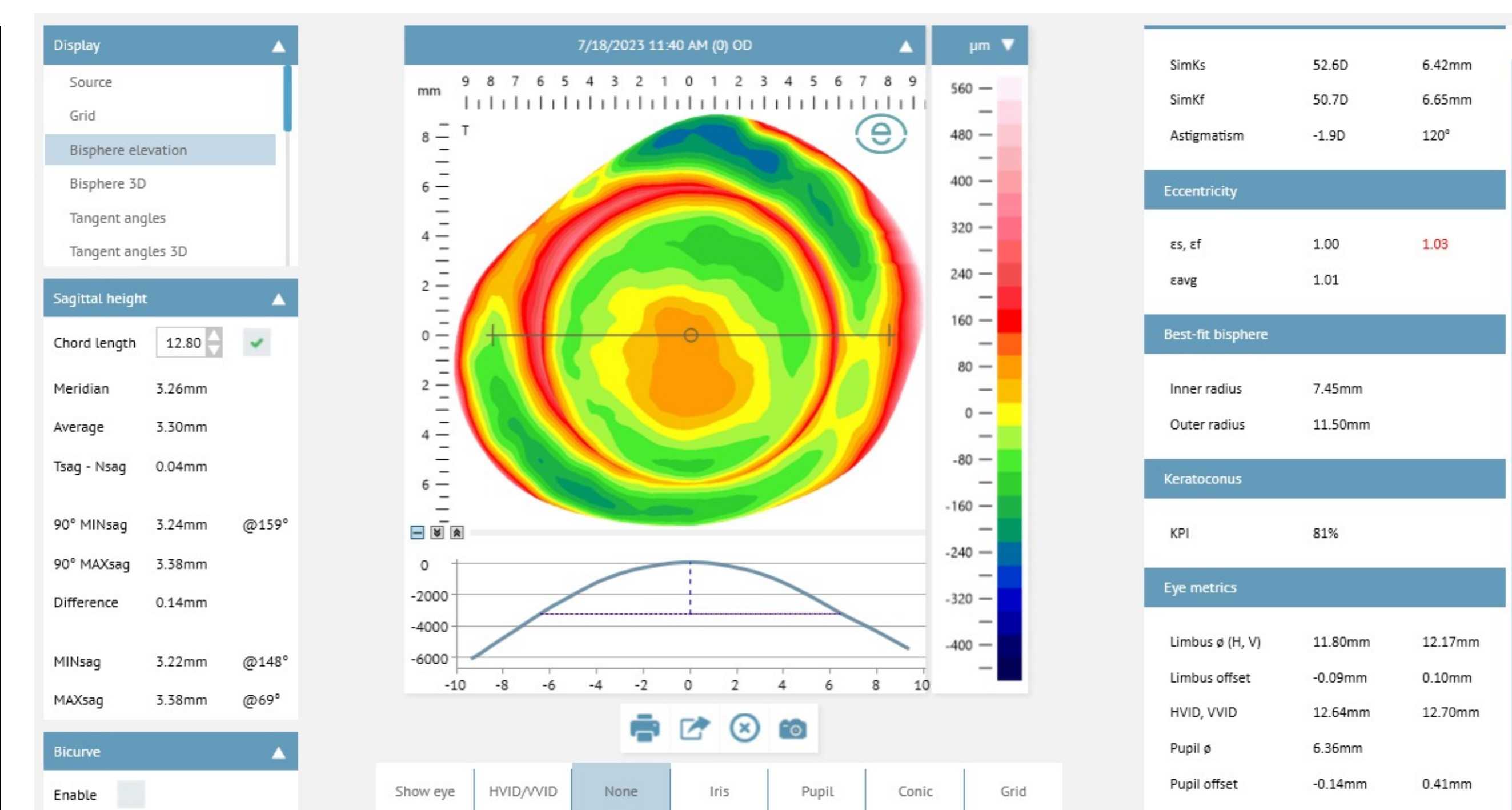


Figure 3: OD Eaglet Scan displaying 90° MINsag and 90° MAXsag values at a 12.8mm chord (approx. HVID) with a 140um difference. This is 53.8% of the toricity measured at a 16mm chord (260um).

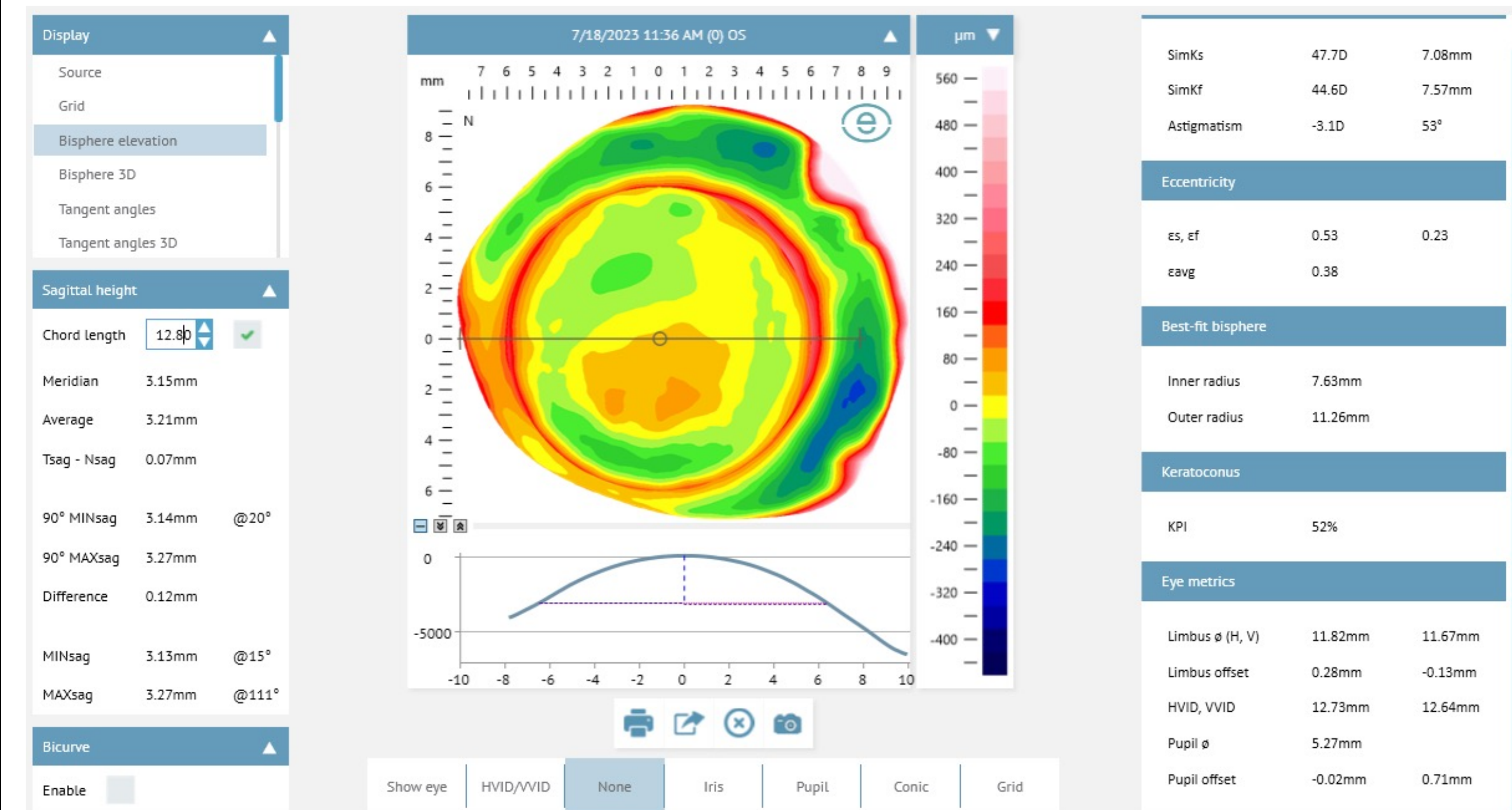


Figure 4: OS Eaglet Scan displaying 90° MINsag and 90° MAXsag values at a 12.8mm chord (approx. HVID) with a 120um difference. This is 63.2% of the toricity measured at a 16mm chord (190um).

Conclusion

The Bi-Elevation design is stated to help with lens decentration, impingement, conjunctival impression rings, and chamber fogging (4). This case shows another possible benefit: rotational stability.

Works Cited

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