



A Case Series: Peripheral Corneal Thinning and Scleral Lenses

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Background

Pellucid Marginal Degeneration (PMD) was historically thought to be a variant of keratoconus with one large anatomical difference: the area of steepening is outside the area of peripheral thinning as opposed to ectasia within the area of thinning.

Terrien's marginal degeneration (TMD) is defined as a disease of progressive corneal thinning with neovascularization and coalesced peripheral lipid opacities often separated from the limbus by a clear zone.

This case series follows a patient with PMD and a patient with TMD who were fit into scleral contact lenses (CLs) as opposed to corneal gas permeable CLs. Due to the location of the ectasia and the anterior corneal elevation difference, to provide functional vision otherwise not achieved by spectacle correction.

Case 1: A 46-year-old male with inferior PMD presented for a CL fitting with complaints of distorted vision and discomfort with current spectacle lenses. The entering visual acuity (VA) was OS 20/50. Slit lamp evaluation revealed corneal steepening inferior to the visual axis with a band of thinning inferior to the apex

Case 2: A 59-year-old male with TMD presented for CL fitting with complaints of progressive non-functional vision. His entering VA was OS 20/200. Slit lamp evaluation revealed severe superior peripheral corneal thinning with neovascularization extending from 9-12 o'clock.

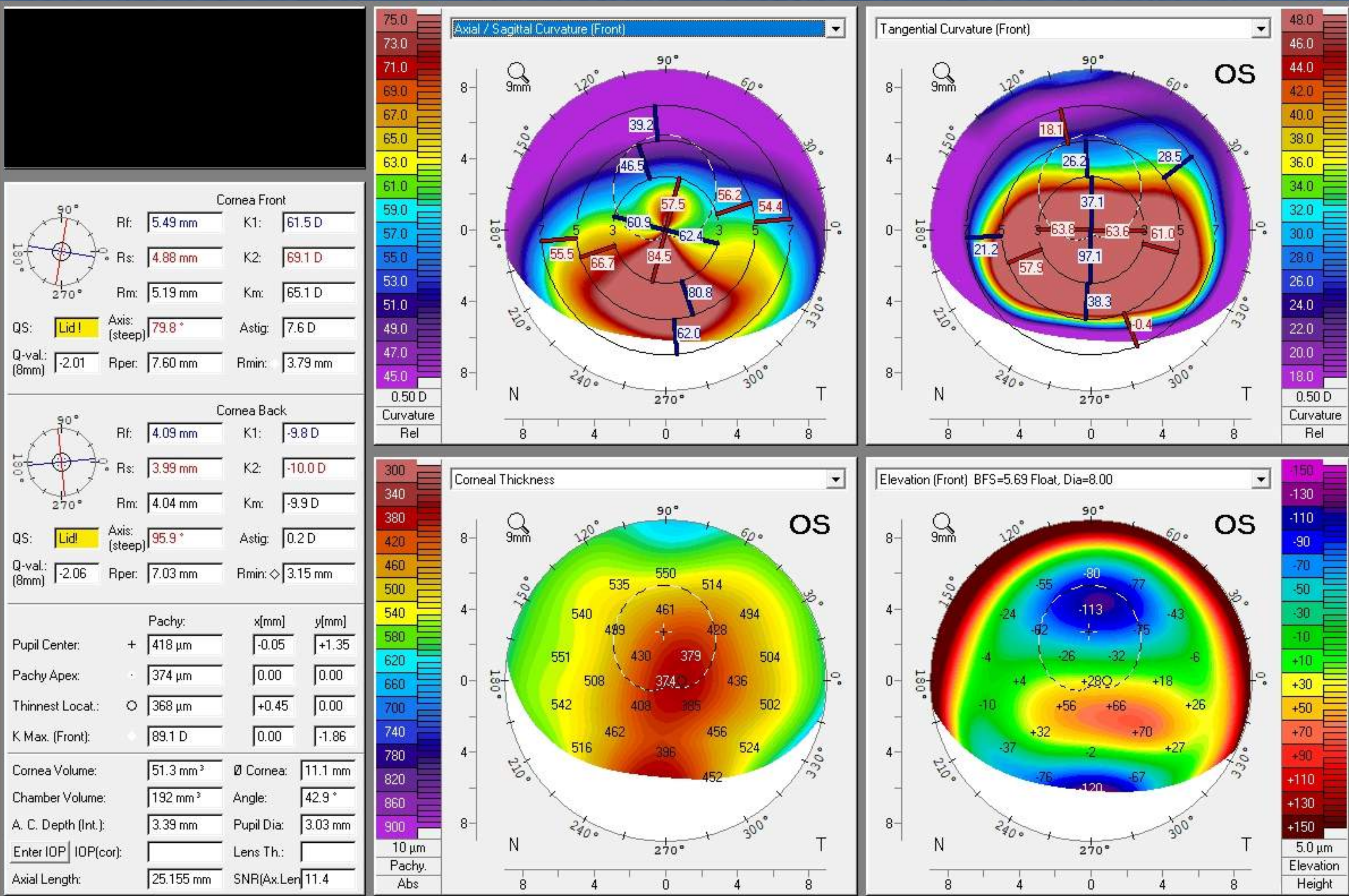


Photo 2: Oculus Pentacam tomography illustrates PMD (case 1) as severe peripheral ectasia and elevation inferior to the visual axis OS. Note elevation differentials as a contributing factor for a scleral CL as opposed to a corneal GP.

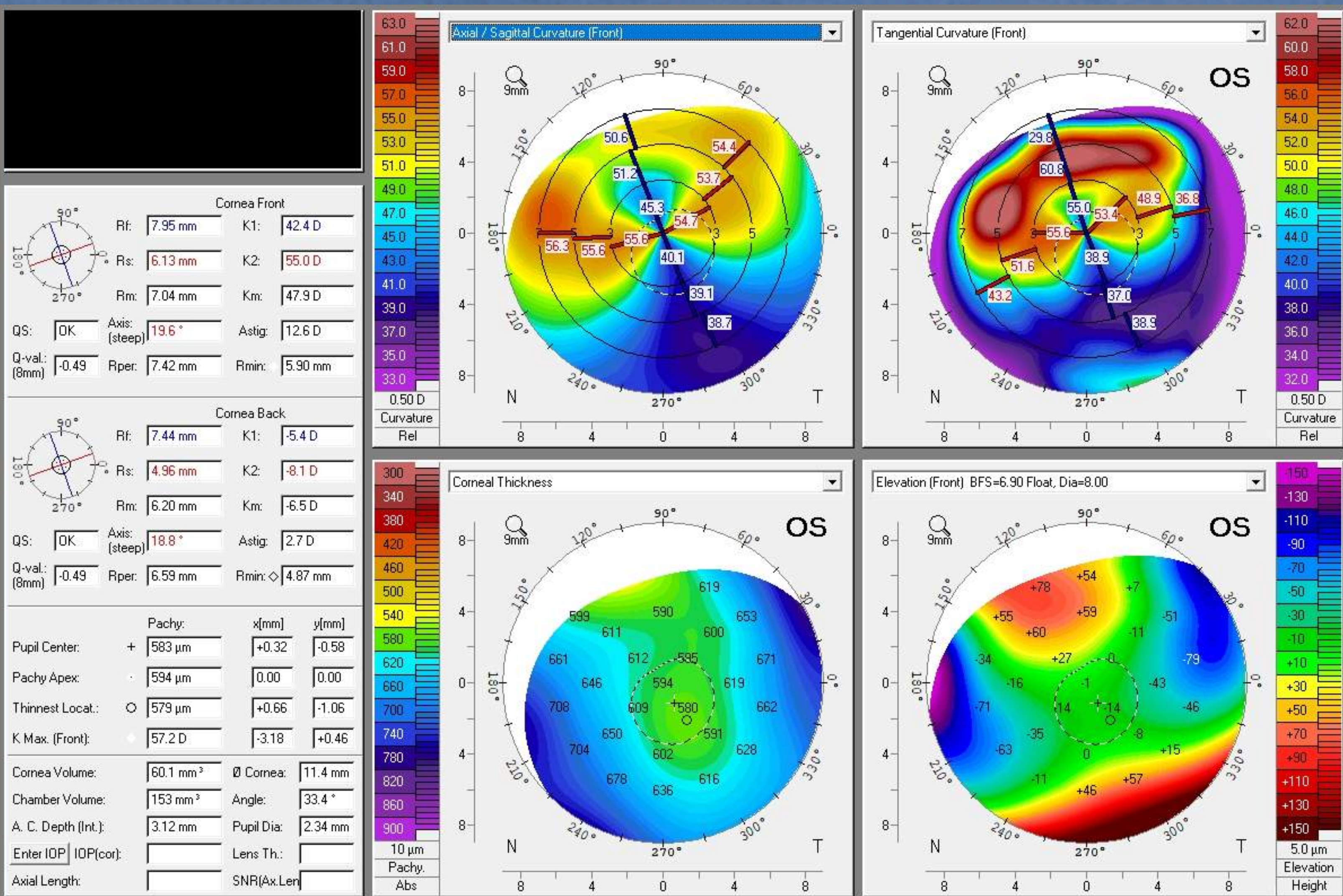


Photo 3: Oculus Pentacam tomography illustrates TMD (case 2) as significant peripheral steepening and elevation superior nasal to the visual axis OS. Note elevation differentials as a contributing factor for a scleral CL as opposed to a corneal GP.

Conclusion

With the capability to modify virtually any lens parameter, scleral contact lenses are a versatile option for highly irregular and ectatic corneas. However, it is crucial to remember that excessive corneal vault risks hypoxic complications, while too little clearance risks bearing, subsequent scarring, and possible perforation. Thus, corneas with considerable elevation differentials may require a more customized fit, which is available to varying degrees through different lens manufacturers.

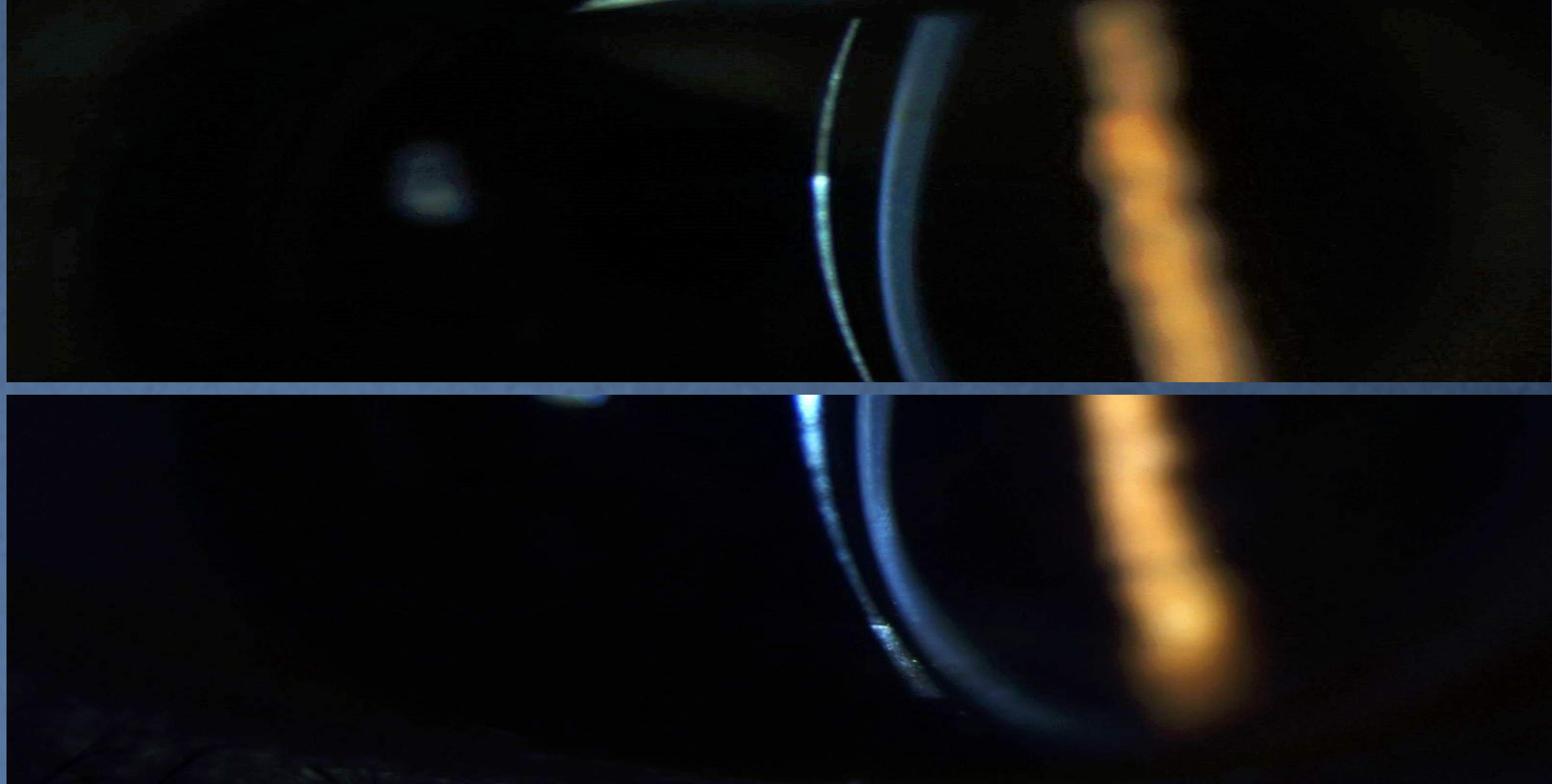


Photo 4: Finalized scleral lens for patient with PMD. Note thinning inferior to apex and excessive clearance superior (top image) and inferior (bottom image) to apex.

Fitting differences

Case 1: In patients with inferiorly displaced ectasias, it is important to note:

- Traditional prolate scleral lenses designed to clear the central cornea may not adequately clear area of increased steepening mid-peripherally. With the risk of scarring and perforation, consider fitting these patients in oblate designs, where the central base curve (BC) is flatter than the mid-peripheral BC to ensure clearance over area of ectasia.

- Inevitably, there may be areas excessive clearance, however, incorporation of hyper Dk materials, may reduce the risk of hypoxia.

Case 2: Patients with superiorly displaced ectasias, it should be kept in mind:

- Superior corneal clearance may not be adequate as scleral lenses tend to decenter inferior temporal due to the weight of the upper lid as well as the natural anatomy of the sclera.

- Perforation from suction forces secondary to a tight-fitting scleral lens has also been reported in literature. To minimize decentration and risk of perforation, the scleral lens haptic should mimic the contour of the patient's sclera as much as possible.

Final lens parameters:

Case 1: VA OS 20/20

Material/Design	BC (mm)	CLP (D)	Dia (mm)	Sag (mm)	CT(mm)	LC/Flx	APS
Boston XO2/ Oblate	8.83	+4.50 -3.75 x 050	17.00	5.50	0.37	-75/-1 flx	Steep4/Flat 4

Case 2: VA OS 20/20

Material	BC (mm)	CLP (D)	Dia (mm)	Sag (mm)	OZD (mm)	CT (mm)	PC1/ W1	PC2/ W2	PC3/ W3	PC4/ W4
Hexa100 Blue	7.67	+1.75	16.00	4.479	8.50	0.37	7.51/ 2.10	9.00/ 0.75	13.00/ 0.50	14.50/ 0.40



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