

Which is Better: Prolate or Oblate? Managing Pellucid Marginal Degeneration with Scleral Lenses

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BACKGROUND

Pellucid Marginal Degeneration (PMD) is a bilateral thinning disorder of the peripheral cornea that typically affects the inferior region in a crescent pattern, presenting as a narrow, clear band of corneal thinning about 1-2 mm in width that extends from 4-8 o'clock. It is most commonly found in males, presents between the second and fifth decade, and has no racial predilection. On topography, PMD shows a classic “crab-claw” or “kissing doves” appearance. PMD can often be misdiagnosed as keratoconus, as they are both corneal ectasias that cause reduced visual acuity from increasing irregular astigmatism.¹

Standard geometry scleral lenses are steepest centrally with flatter peripheral curves that best fit prolate corneas. The shape of a normal cornea is prolate. Reverse geometry scleral lenses are flatter centrally and best fit oblate corneas that are flat in the center, steeper in the mid-periphery, and flatter near the limbus.²⁻³ Reverse geometry lenses are indicated when the corneal apex is outside the central four millimeters.⁴ Their steeper secondary curves help to better align with the oblate corneal contour.⁵ However, the reverse geometry lenses could potentially cause superior lens binding, resulting in inadequate tear exchange and persistent epithelial damage.¹

A 50 year old Caucasian female presented to our clinic with history of PMD in both eyes. She had previously worn Dyna Intralimbal lenses, but had not worn contact lenses for six years due to financial cost.

The patient's BCVA with spectacles:
OD: 20/100
OS: 20/250

Corneal topography with the Pentacam revealed simulated keratometry readings of:
OD: 35.2 @ 80.3 / 48.5 @ 170.3
OS: 36.1 @ 99.8 / 48.3 @ 9.8

The axial maps showed a “kissing doves” pattern consistent with PMD.

Though both eyes were similar in shape and severity of progression, the patient was fitted with Zenlens Prolate on the right eye and Zenlens Oblate on the left eye. With the initial lenses, the patient reported fogging in the left eye more than the right, so the sagittal depth was decreased.

The second pair still produced mild fogging greater in the left eye, so the peripheral curves were steepened. iVue ocular coherence tomography (OCT) was used to confirm mild bearing inferiorly in the mid-periphery on the right eye so the base curve was flattened. With the third pair of lenses, the patient reported good vision, comfort, and decreased fogging.

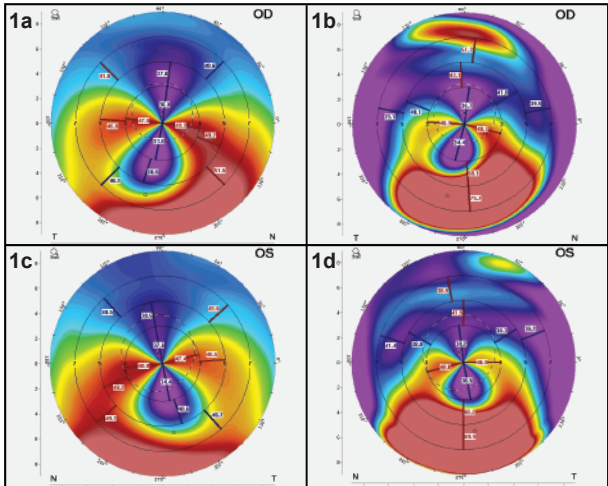


Figure 1: Pentacam images from the initial visit showing: (a) axial map of the right eye, (b) tangential map of the right eye, (c) axial map of the left eye, and (d) tangential map of the left eye.

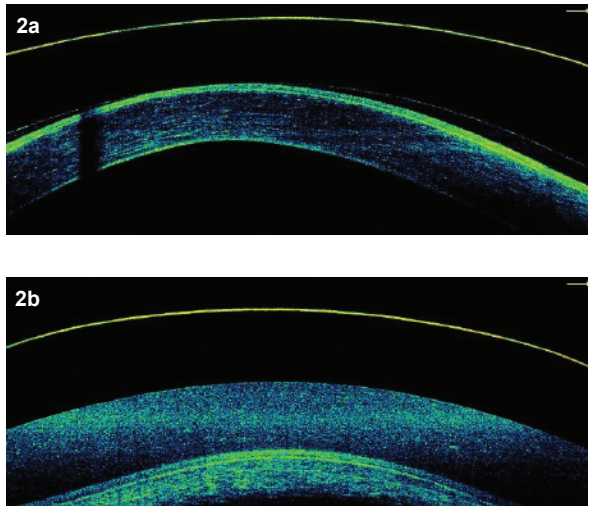


Figure 2: iVue OCT images showing the (a) bearing of the right prolate lens on the inferior cornea and (b) adequate central clearance of the left oblate lens.

CASE DESCRIPTION

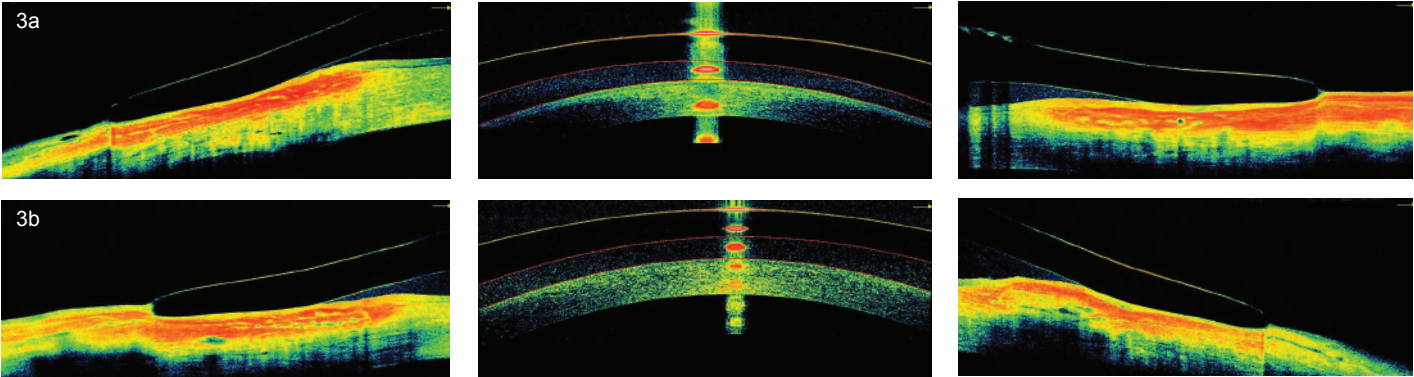


Figure 3: iVue OCT images showing the final lens fit on the (a) right eye and (b) left eye.

	OD - Zenlens Prolate	OS - Zenlens Oblate
Diagnostic Lens (in office)	7.30 BC / 17.0 dia / - 2.00 DS / std APS / 5200 sag	8.50 BC / 17.0 dia / -2.00 DS / std APS / 5400 sag
Trial Lens #1	7.30 BC / 17.0 dia / - 17.00 DS / std APS / 5200 sag (power change)	8.50 BC / 17.0 dia / -8.50 DS / std APS / 5400 sag (decrease sag, power change)
Trial Lens #2	7.30 BC / 17.0 dia / - 16.00 DS / std APS / 5200 sag (flatten BC)	8.50 BC / 17.0 dia / -10.00 DS / std APS / 5200 sag (steepen periphery)
Final Lens	7.81 BC / 17.0 dia / - 13.00 DS / std APS / 5200 sag	8.50 BC / 17.0 dia / -10.00 DS / steep 3 APS / 5200 sag

Table 1: Details of the lens parameters

CONCLUSION

Both prolate and oblate lens designs can be used in the management of PMD. While the oblate design would suggest better alignment with the peripheral elevation, fitting challenges, such as fogging, may still occur. However once the best fit was achieved, the oblate design provided a greater improvement in visual acuity compared to the prolate design. The visual acuities with the final lenses were 20/40-- with the prolate lens and 20/30++ with the oblate lens. The prolate design on the right eye caused bearing in the area of elevation after extended wear, but that was managed by steepening the base curve to increase the mid-peripheral clearance while maintaining the central clearance. It is important to note that both lens designs can be used in the management of PMD, but the challenges with each fit will vary with the different designs.

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