Management of Post-Refractive Oblate Corneal Shape and Myopic Regression with a Novel Custom-Soft Dual Base Curve Design

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Case Description - continued

Fig 3. Profilometry data depicting range in elevation and sagittal height in a cornea of larger HVID.

Discussion and Conclusion

In post-LASIK patients seeking vision correction with a soft contact lens, a customized oblate lens design is proposed to match the post-surgical corneal shape.

The process of designing the lenses in this case was to select an initial central base curve from a previous best-fitting lens, and a steeper peripheral base curve. The difference was increased between the dual base curves by flattening the central curve and steepening the peripheral curve until lens stability was achieved. Alternatively, optic zone diameter could also be adjusted to fit the fit. A smaller diameter would transition into a peripheral curve that steepens sooner, resulting in a tighter and more stable peripheral fit.

There is also a thought of using imaging-driven data for oblate lens design. Topography data could be helpful in determining the optic zone diameter based off ablation zone and keratometry values in determining starting base curves. Alternatively, there have been reports of significant sagittal height differences between soft contact lenses of the same base curve, which can affect on-eye behavior of the lens. The impact that diameter variability has on sagittal height relative to curvature changes is much more significant. Profilometry data at a certain chord length may be beneficial in determining lens parameters, especially in patients with a larger HVID such as this case (Fig 5).

Best-Fitting Lens Parameters

OD
Central BC 9.20; Peripheral BC 8.5; Pwr -0.75; Dia 15.0; Ct 0.13; 8.00 OZ; 0.20 EL

OS
Central BC 9.20; Peripheral BC 8.5; Pwr -1.00; Dia 15.0; Ct 0.13; 8.00 OZ; 0.20 EL

These lenses provided the ideal lens centration and movement (Fig 4). With improved stability, the patient was able to achieve VA 20/20 OD, OS, without visual fluctuations between blinks.

Using soft oblate lenses in post-refractive corneas has its limitations. In this case, there was minimal refractive astigmatism which made lens stability easier to achieve as there was no need for rotational stability. Methods for toric stabilization that are utilized in other soft lens designs could be incorporated. Unfortunately, it is not uncommon for post-refractive astigmatism to be irregular and would still require a rigid contact lens to achieve best-corrected vision. Ideal patient selection criteria are a decentration of the ablation zone, which could affect lens stability due to mismatch between location of the oblate shape and lens cornea.

Vision challenges that are faced by patients who have undergone a refractive surgery with no complications are often overlooked. Many patients that undergo refractive surgeries are seeking freedom from spectacles. If contact lens wear is necessary, patients deserve a modality they are comfortable and familiar with which is often soft lenses. Custom oblate, dual base curve soft lenses are a novel design and should be considered in post-refractive contact lens fittings.

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References


Fig 4. Final custom soft oblate lens designs on eye that showed lens desensitize with eye movement and stability to the center when returning to primary gaze.

Fig 5. Profilometry data depicting range in elevation and sagittal height in a cornea of larger HVID.