Custom Scleral Lens Fitting Using The Eaglet Eye Surface Profiler  
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Abstract

Patient KT presented with a history of LASIK and CL intolerance. A corneo-scleral topographer was used to design a well fitting scleral contact lens with a toric haptic zone to accommodate a highly aspheric sclera.

I. Case History

KT, a 24-year-old African-American female, presented for a scleral lens fit after previously being unsuccessful with soft lenses and corneal GP lenses. Her ocular history is significant for LASIK refractive surgery resulting in residual myopia. Her medical history was unremarkable.

II. Pertinent Findings

KT’s best-corrected visual acuity was 20/15 OD and OS with the manifest spectacle refraction. All preliminary tests were unremarkable. Biomicroscopy revealed corneal LASIK scars and mild, off-axis congenital cortical cataracts OU. Ocular health was otherwise unremarkable. Pentacam corneal topography yielded central K values of 38.4/37.9D@159.3 OD and 38.9/38.4@67.6 OS, with a mid-peripheral “knee” of steepening that is characteristic of post-refractive topographies. KT was initially fit in a 16.8mm Custom Stable Elite (toric haptic design) lens. Based on the fluorescein pattern and over refraction, the right lens ordered was a -3.50DS, 8.65mm BC, 4510 SAG, scleral landing zone of +1/-4, and the left lens was a -2.00DS, 8.65mm BC, 4510 SAG, scleral landing zone of -2/-1.

III. Differential Diagnosis

KT has flat K’s and mild myopia secondary to LASIK.

Scleral lenses were chosen for this patient, but possible alternative treatment options could include:
1. Custom soft lenses that could be used to mask the central flattening with a thicker central carrier on the lens
2. Hybrid contact lenses, such as the FC Ultra Health lens, could also be used to allow for improved comfort
3. Piggyback lenses could be fitted to improve comfort and increase the tolerance of corneal GP lenses

IV. Diagnosis and Discussion

Refractive surgery is commonly and successfully used to eliminate the need for optical devices; however, when they are still needed, the change in the corneal surface can make contact lens options more limited than before surgery. For KT, LASIK surgery had flattened her central corneas to the extent that commercially available soft contact lenses had a poor fit, resulting in discomfort and visual instability. Low modulus soft lenses were fit to improve the draping of the lenses in an attempt to stabilize the acuity, without success. Corneal GPs were also attempted, but KT was unable to adapt due to excessive discomfort. For post-refractive patients like KT, Scleral lenses are a great option because they vault the cornea completely and land on the sclera, and the lacrimal lens created neutralizes corneal irregularities to improve optical quality. These lenses provide good comfort by landing on the relatively insensitive sclera, compared to corneal GPs that land on the highly innervated cornea. Landing evenly on the sclera can be difficult because the sclera is relatively aspheric. Furthermore, there are limited methods currently available to measure the degree of asphericity. The application of a corneo-scleral topographer to measure the elevation past the limbus is proving to be useful in scleral lens fittings. The Eaglet Eye Surface Profiler [ESP] scans a 20mm diameter across the anterior surface of the eye, collecting over 250,000 data points to create a 3D elevation map of the cornea and surrounding sclera.

V. Treatment

KT presented for the dispense of her first scleral lenses and was experiencing good vision, but the fit of both showed excessive movement and she reported discomfort. Eaglet ESP scans were used to assess the sclera and showed scleral asphericity. Using this information, new lenses were ordered; the right eye was kept in a 16.8mm Custom Stable Elite lens, -4.00 DS, 8.65mm BC, 4510 SAG, with a toric scleral landing zone of -2/-5, and the left eye was changed to a 16.8mm Custom Stable Lens, -2.50 DS, 8.65mm BC, 4510 SAG, with a spherical scleral landing zone in a -3. When dispensed, along with 20/15 acuities and good central and limbal clearance, the new lenses showed good scleral alignment and no longer had undesired movement. KT reported great comfort and the lenses were successfully dispensed. No changes were needed to be made to the lenses at any follow-ups after this.

VI. Conclusion

In recent years, scleral lenses have become more common and are now being used beyond “diseased corneas”. This is creating a need for improved technology to allow for more accurate and easier fittings, including topography that extends beyond the limbus.