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Meridional Differences in Sagittal Height at 12 mm and 16 mm chords

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PURPOSE

Most eyes demonstrate a degree of toricity on the ocular surface and scleral lenses are increasingly made with toric haptics to accommodate the differences in elevation in the principle meridians. However in nearly all cases the elevation differences are managed in the haptic zone of the scleral lens entirely, while the cornea often has some degree of toricity, which leads in many cases to poor lens alignment in the scleral zone, particularly on the inner aspect of the lens landing area. The purpose of this retrospective study was to compare how much of the meridional difference in elevation on the ocular surface is related to corneal toricity vs. scleral toricity and the implications in scleral lens fitting.

METHODS

28 eyes of 14 patients with completed Eye Surface Profiler scans were evaluated for difference in the sagittal height of the two major meridians at a 12 mm chord (approximately the corneal diameter) to determine the corneal contribution to the elevation difference in each meridian and a 16 mm chord to determine the overall meridional difference in sagittal height on the ocular surface. Using the instrument software to display min and max SAG values at a given chord, the values were recorded and analyzed.

The cornea contributes a significant percentage of the elevation difference in the anterior segment of the eye. Because most scleral lenses compensate for this elevation difference in the scleral landing zone, this can often create suboptimal fitting outcomes.

RESULTS

The mean difference in elevation at a 12 mm chord was 122 microns with a standard deviation of 76 microns. The mean elevation difference at a 16 mm chord was 185 microns with a standard deviation of 83 microns. On average, 2/3 of the sagittal height difference between the principle meridians is contributed by the corneal shape, whereas most scleral lens designs compensate for sag differences entirely in the scleral landing zone.

CONCLUSIONS

The cornea contributes a significant percentage of the elevation difference in the anterior segment of the eye. Because most scleral lenses compensate for this elevation difference in the scleral landing zone, this can often create suboptimal fitting outcomes. Consideration for providing some correction for this corneal shape factor should be given by manufacturers and lens designers.