

Scleral Lenses for Professional Basketball Player with High Corneal Astigmatism

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INTRODUCTION

Astigmatism can be corrected with both spectacles and contact lenses. Patients with uncorrected astigmatism experience blurred vision at distance and near and may notice visual distortions. The cornea and the crystalline lens can induce astigmatism when there is asymmetric curvature of the front and back surfaces. The crystalline lens can also cause astigmatism through decentration, tilting, or variation in the index of refraction¹.

Gas permeable (GP) contact lenses provide a unique advantage in correcting front-surface corneal astigmatism due to the tear lens, which compensates for corneal toricity and can reduce or eliminate residual astigmatism. With the cornea accounting for most refractive astigmatism, specialty corneal and scleral GP lenses can be a successful option for patients with high corneal astigmatism.

CASE DESCRIPTION

27-year-old male, professional basketball player complaining of variable vision in soft CLs

Spectacles are the preferred method of correction, Uses soft toric lenses while exercising and playing basketball.

VA in soft contact lenses ranges from 20/20-2 to 20/50 OD/OS due to lens rotation.

Manifest Rx

+4.50 -5.25 x 016, VA 20/20 OD
+4.25 -5.00 x 163, VA 20/20 OS

Keratometry

40.62/45.62 @ 106 OD
41.12/46.00 @ 078 OS

The patient underwent in-office diagnostic scleral lens fitting to provide more stable refractive correction with superior comfort than would be provided by corneal GP lenses. See Table 1.

ORDERING LENSES

Based on the assessment of diagnostic lenses found in Table 1, lenses were ordered with steepened haptics in the vertical meridian, reduced central sagittal depth OS, reduced limbal vault OD/OS, and reduced sagittal depth in the mid-periphery of vertical meridian to improve centration and overall fit of the lenses.

The power of the lenses was only estimated due to the flexure of the lenses. A second pair of lenses will need to be ordered based on the over refraction with properly fitting lenses.

Table 1. Evaluation of Diagnostic Lenses

	16 mm Diameter, 4800 um Sag Lens	17 mm Diameter Lens, 4600 um Sag Lens
Central Vault	OD: 296 um (4500 sagittal depth) OS: 412 um (4800 sagittal depth)	OD: 183 um (4300 sagittal depth) OS: 363 um (4600 sagittal depth)
Limbal Vault	Excessive 360, OU	Adequate in horizontal meridian and excessive in vertical meridian, OU
Nasal and Temporal Fit	Slight impingement	Slight impingement
Superior and Inferior Fit	Excessive edge lift	Excessive edge lift
Centration	Significant inferior decentration	Significant inferior decentration
Over Refraction	Not assessed due to poor fit	+1.00 -1.50 x 015 OD +0.50 -1.00 x 155 OS
Topography of Lenses	Flexure present	Flexure present

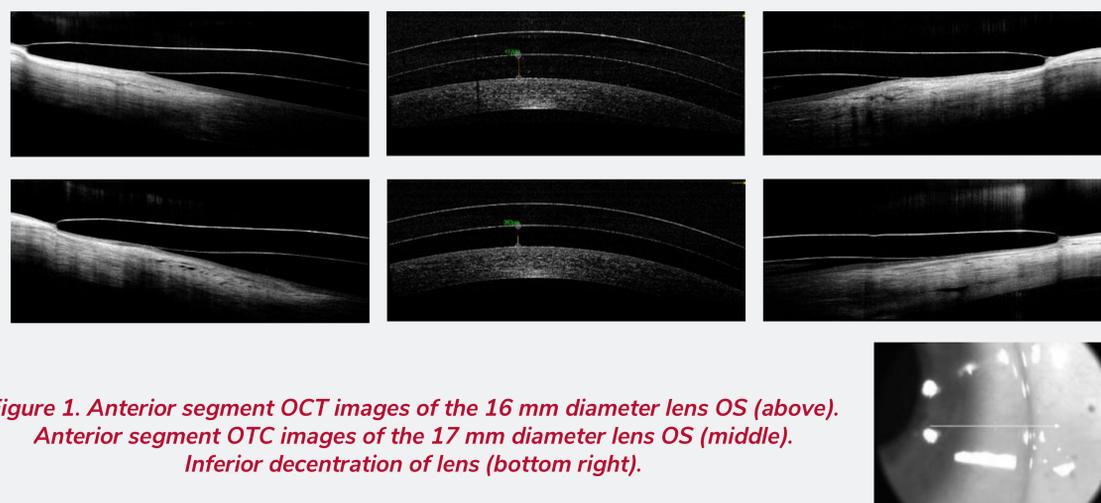


Figure 1. Anterior segment OCT images of the 16 mm diameter lens OS (above). Anterior segment OCT images of the 17 mm diameter lens OS (middle). Inferior decentration of lens (bottom right).

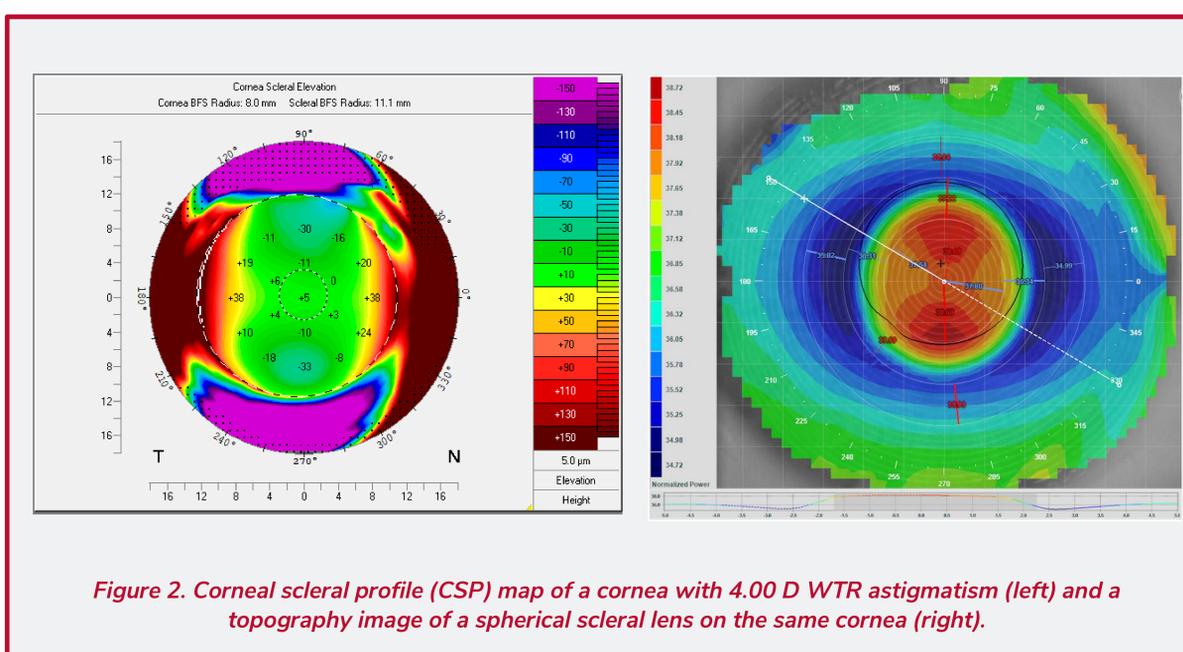


Figure 2. Corneal scleral profile (CSP) map of a cornea with 4.00 D WTR astigmatism (left) and a topography image of a spherical scleral lens on the same cornea (right).

DISCUSSION

Scleral lenses are most often fit on eyes with surface disease or damage, or to address irregular corneal astigmatism. In this case, scleral lenses were used to fit high, regular astigmatism.

Flexure of scleral lens can occur when the shape of the haptics are significantly different than the surface of the sclera. Flexure can be mitigated by altering haptic toricity and changing the center thickness of the lens.

Soft contact lenses are effective in correcting mild to moderate amounts of refractive astigmatism. High astigmatism resulting from corneal toricity may be better addressed in a specialty GP lens.

Every 10 degrees of rotation reduces the lens' toric power by 33%². Toric lenses with higher amounts of cylindrical power create more visual degradation with lens rotation compared to lenses with less astigmatism correction.

Although objective acuity measurements may not differ between soft and GP lenses in patients with moderate and severe astigmatism, many patients report subjectively improved visual quality in day-to-day activities with a GP lens³.

As with the patient described here, corneal astigmatism often correlates with refractive astigmatism. In such cases, the tear lens of a spherical GP lens can fully correct the astigmatism and make lens rotation irrelevant to the effective power of the lens.

In addition to visual performance, highly astigmatic corneas can present a challenge in acquiring good fit of lenses. Scleral lenses are susceptible to rocking and edge lift along the steep meridian of a toric sclera. Excessive vault may also be observed with high corneal toricity. Many scleral lens brands allow for meridian-specific vault adjustments to avoid excessive vault and improve centration of the lens⁴.

CONCLUSION

Many astigmatic eyes fall outside the parameters of readily available soft toric contact lenses, and spectacles are not compatible with all daily activities. Specialty GP contact lenses, especially scleral lenses, can provide patients with enhanced comfort and superior optical stability without compromising lifestyle demands.

REFERENCES

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