

INTRODUCTION

Keratoconus is a corneal condition that causes the cornea to take on an inferior-cone-like shape. This often leads to a decrease in visual acuity, as well as subjective glare, starbursts, and “ghosting” of images. While soft contact lenses can improve vision for keratoconus early on, rigid gas permeable and scleral lenses are required as the disease progresses. However, these traditional specialty lenses sometimes leave uncorrected higher order aberrations (HOAs) in patients with severely impacted anterior or posterior corneal surfaces. These HOAs can be corrected with wavefront guided scleral lens technology, which often results in higher quality vision for the patient.

CASE DESCRIPTION

A 43-year-old black male with severe keratoconus OU presented for a contact lens fitting with a history of RGP and scleral lens wear. He had complaints of blurry vision, glare, and “ghosting” of images that could not be corrected with spectacles alone. A traditional scleral lens fit was initially performed OD; however, a referral was made for a corneal transplant OS due to severe corneal scarring that inhibited the improvement of vision.

CONTACT LENS FINDINGS

Initial Visit – Traditional Scleral Lens Fit

CS Elite 15.8 / BC 7.85 / DIAM 15.8 mm / PWR +1.75

- BCVA: 20/60 with subjective letter “ghosting”
- Fit: adequate diameter, clearance, landing zone, and lens edge
- A baseline OVITZ xwave scan performed, illustrating various degrees of HOAs (Figure 3)
- A lens was ordered to correct these aberrations

Trial #1 – OVITZ Ares Lens

OVITZ Ares 15.8 / BC 7.85 / DIAM 15.8 mm / PWR +1.75

- BCVA: 20/50 with an improvement of the subjective “ghosting”
- The OVITZ scan revealed slight improvements from the baseline aberrations
- Lens dispensed; new lens ordered based on OVITZ scan

Trial #2 – OVITZ Ares Lens

OVITZ Ares 15.8 / BC 7.85 / DIAM 15.8 mm / PWR +1.75

- BCVA: 20/40 with similar amounts of “ghosting”
- The OVITZ scan still revealed the prominent aberrations captured from the baseline scans
- Lens dispensed; new lens ordered based on OVITZ

Trial #3 – OVITZ Ares Lens

OVITZ Ares 15.8 / BC 7.85 / DIAM 15.8 mm / PWR +1.75

- BCVA: 20/25 with a complete subjective elimination of the letter “ghosting”
- An OVITZ scan revealed large improvements on the major aberrations present at baseline (Figure 3)
- Final lens dispensed

OCULUS - PENTACAM 4 Maps Refractive

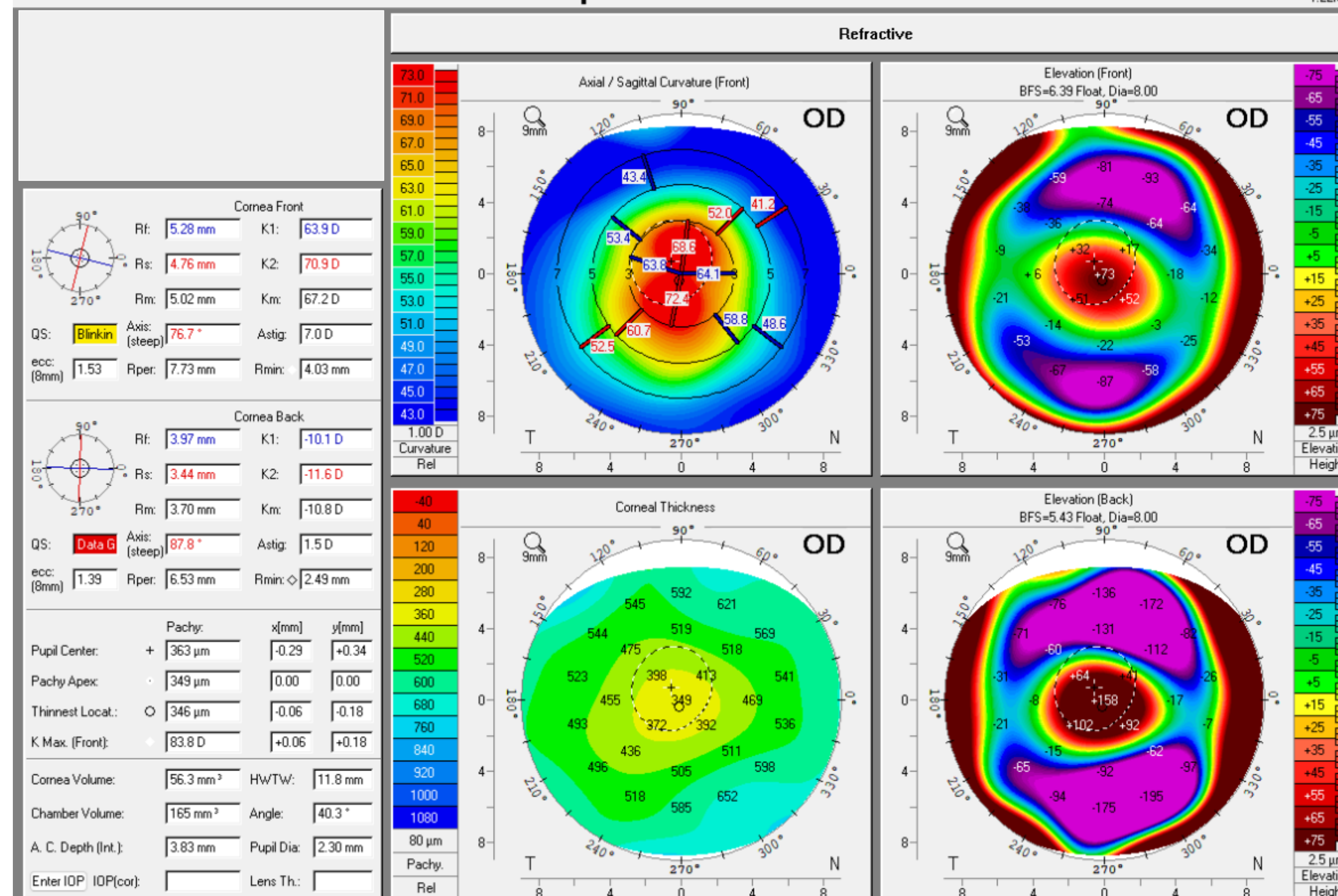


Figure 1. Pentacam 4 Maps Refractive scan of the right eye showing severe keratoconus. This is illustrated by inferocentral steepening in cone-like shape on both the anterior and posterior corneal surface. The patient was referred for a corneal transplant in the left eye due to prominent corneal scarring, so those scans are not relevant to this case.

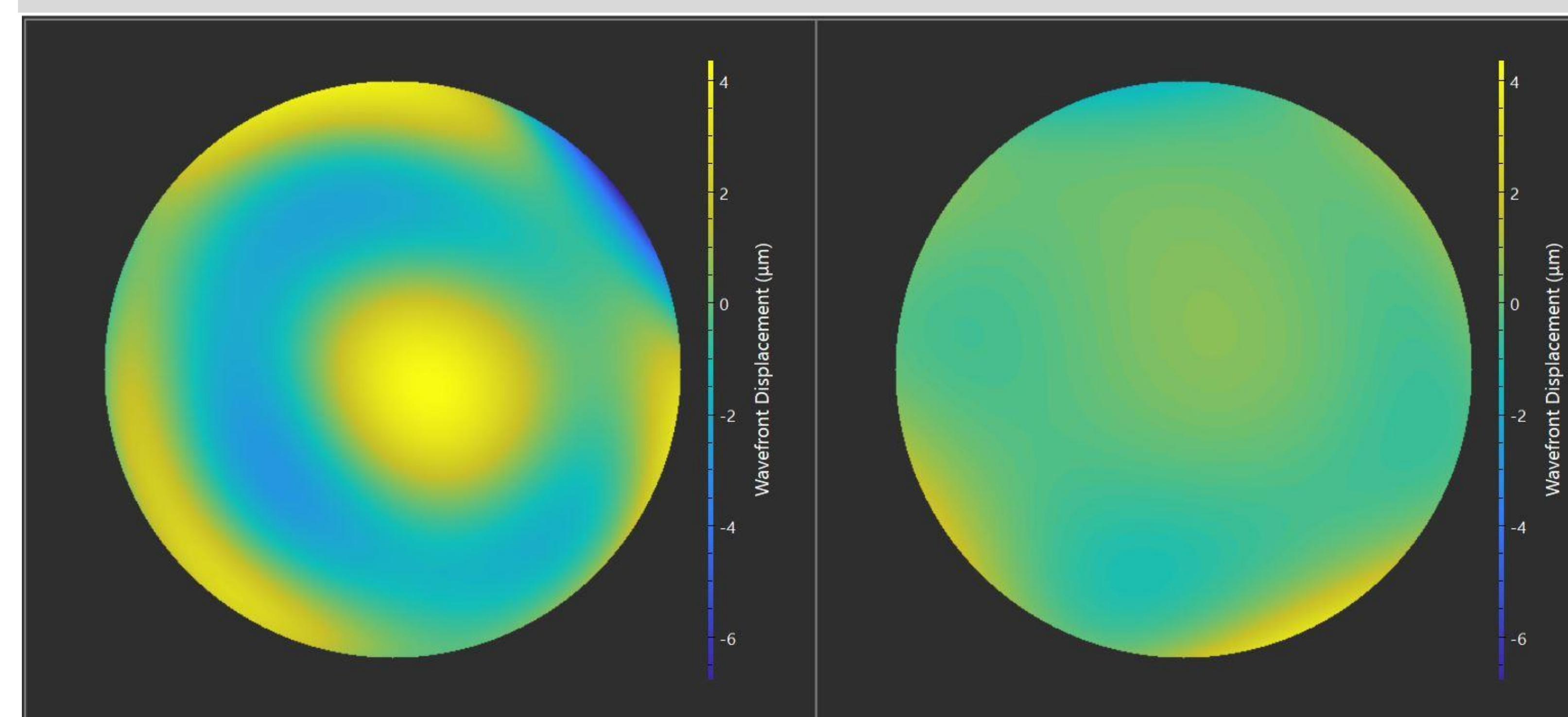


Figure 2. Wavefront Displacement map produced by the OVITZ xwave system in the right eye. This illustrates the extent and location of the HOAs present with the baseline lens (left) and at the time of the final lens order (right).

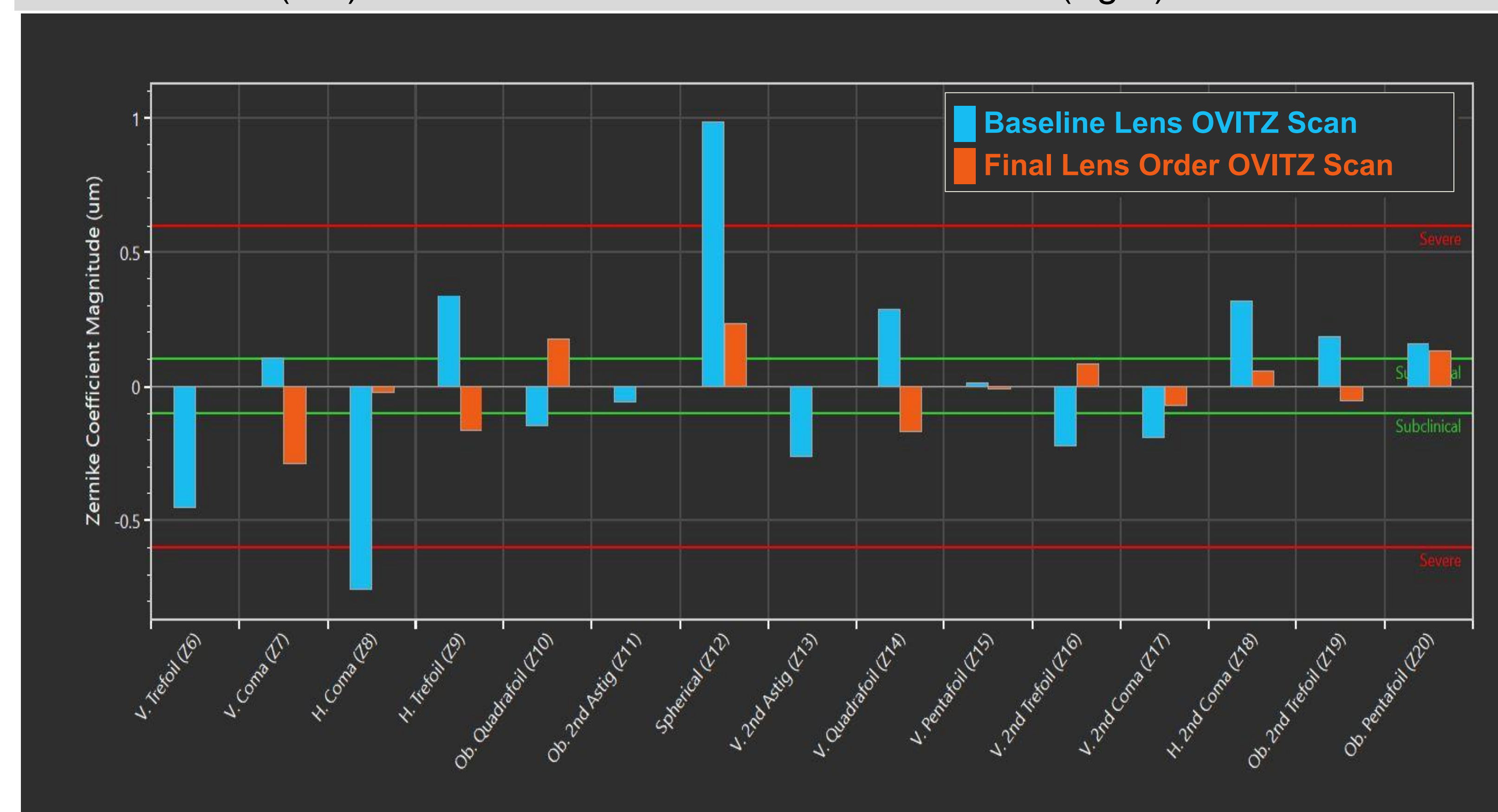


Figure 3. Zernike Plot of the right eye produced by the OVITZ xwave system. The blue bars illustrate the extent of each type of HOA at baseline, while the orange bars illustrate the extent of each type of HOA at the final lens order.

DISCUSSION

Even in milder forms, keratoconus is often a difficult corneal ectasia to fully correct. In severe cases, as seen with this patient with keratometry values approaching 70 D in the right eye (Figure 1), achieving clear vision without glare, halos, or image “ghosting” can be even more challenging. Due to the steepness and central location of the cone, this patient both subjectively and objectively experiences the visual effects due to the aberrations present. The patient was initially fit into a traditional CS Elite scleral lens which, while improved his visual acuity and fit well, left him with unwanted “ghosting” which he described as a “smearing of the letters.” This is likely due to aberrations stemming from posterior corneal irregularities, which cannot be fully corrected with traditional scleral lenses. Using the OVITZ xwave system, an aberrometry scan was taken using a properly fitted pre-HOA lens as illustrated in Figures 2 and 3. The first Wavefront Displacement image as seen in Figure 2 illustrates both the extent and location of the baseline HOAs present without HOA correction, while the blue bars on the Zernike plot in Figure 3 show the extent of each type of baseline HOA present. After taking these scans, the data was sent to create an OVITZ Ares lens, with the goal to decrease or eliminate the aberrations picked up by the xwave scan. This base lens arrives with markings to better align the patient in the xwave system for future scans, however the final lens arrives with a single drill marking that should settle at 6 o'clock.

CONCLUSION

Correcting mild to moderate keratoconus with traditional lenses often takes multiple visits and patience to get the refraction and fit ideal. When the patient is also experiencing extensive HOAs, this process is lengthened since the aberrations need to be neutralized which usually takes numerous more lens orders. While this case took multiple visits, multiple scans, and multiple months to complete, the final lens order left the patient with both the best visual acuity and visual quality the patient had experienced in years. This is objectively seen with the final Wavefront Displacement map in Figure 2 and Zernike plot in Figure 3. When choosing a starting lens, it is important to listen to the patient’s subjective complaints regarding their vision, as the overall vision quality goes far beyond the best line a patient can achieve on the Snellen chart.

ACKNOWLEDGEMENTS

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REFERENCES

References: Can be emailed upon request