

Refining Astigmatic Correction

COMPARING WAVEFRONT-OPTIMIZED AND TOPOGRAPHY-GUIDED ABLATION PROFILES.



BY KARL G. STONECIPHER, MD

In the realm of astigmatism correction, wavefront-optimized (WFO) and topography-guided (TCAT) treatments offer distinct approaches to enhancing visual outcomes. This article contrasts these two techniques with an emphasis on their application in patients with normal corneas and astigmatism. Simply put, the goal of treating any refractive error or higher-order aberrations (HOAs) is to improve the patient's quality and quantity of vision without inducing other issues that interfere with the optical system.

TWO BASIC ABLATION PROFILES

Overview. Two basic corneal refractive ablation profiles have been widely adopted and compared: wavefront-optimized (WFO) treatment and topography-guided treatment (TCAT).¹ The WaveLight excimer laser platform (Alcon) was originally approved for WFO treatments and later approved for TCAT with the Vario diagnostic device (Alcon).²⁻⁶ Some surgeons prefer the ease of WFO treatment to newer options.

The Phorides Analytic Engine (Phorides) can improve TCAT outcomes with the Contoura Vision System (Alcon) by using topographic information to determine how best to treat sphere and cylinder. The InnovEyes Sightmap diagnostic device available with Wavelight plus (Alcon; not yet available in the United States) improves overall outcomes by using biometry, tomography, and wavefront aberrometry measurements to guide the WFO treatment of myopia and myopic astigmatism.⁷⁻⁹

Research results. In a prospective FDA study of normal eyes undergoing Contoura TCAT based on the manifest refraction, 92.6%, 63.8%, 34.4%, and 15.7% achieved an uncorrected distance visual acuity (UDVA) of 20/20 or better, 20/16 or better, 20/12.5 or better, and 20/10 or better, respectively, at 12 months. Additionally, 30.9% of eyes gained 1 or more lines of UDVA compared with their preoperative corrected distance visual acuity.

A small study of 86 eyes by Kim et al found that more patients who underwent WFO treatment versus TCAT achieved 20/16 UDVA or better, but the difference was not statistically significant.¹⁰ TCAT also induced fewer total corneal HOAs ($P = .13$) and less coma ($P = .003$).

Several retrospective studies have compared the results of TCAT with the Contoura Vision System based on the manifest refraction versus guidance from the Phorides software. The two treatment profiles were shown to be equivalent for 20/20 UCVA, but more patients in the Phorides group achieved 20/15 and 20/10 UCVA.^{7,8} Several other studies in which a manifest refraction-based nomogram was used also showed that TCAT with Contoura was highly effective.¹¹⁻¹³



CHOOSING AN APPROACH

Both WFO treatment and TCAT can achieve excellent visual outcomes, especially at the 20/20 level. TCAT with Contoura has the potential to provide better visual outcomes and has been used successfully on a wide range of patients. There are two situations, however, in which WFO treatment is clearly preferable. The first is when high-quality topographic images cannot be obtained, making it difficult to define anterior corneal elevations. The second is when the clinical refraction is outside the FDA-approved parameters for the Contoura Vision System (eg hyperopia, myopia > -8.00 D, cylinder > 3.00 D, manifest refraction spherical equivalent > -9.00 D).

At the 2023 ESCRS congress, Bala reported the best refractive and astigmatic LASIK treatment results to date with Wavelight plus.9 In the clinical trial, 100%, 89%, and 50% of myopic eyes with and without astigmatism achieved a UDVA of 20/20, 20/16, and 20/12.5 or better, respectively. Quality of vision did not decrease, and no clinically significant increase in total HOAs was observed.

CONCLUSION

WFO treatment and TCAT are effective at the 20/20 level. TCAT with the Contoura Vision System using the PhorCides Analytic Engine provides better visual outcomes overall, but there are situations in which WFO treatment is preferable. ■

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