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COVER
FEATURE

Management of the irregular cornea Getting started with topography-guided ablations

by Lauren Lipuma EyeWorld Contributing Writer

As topography-guided LASIK enters the U.S. market, experienced surgeons share valuable knowledge they've gained about the technology

After more than 15 years in international markets, topography-guided ablations are finally available to U.S. surgeons. Alcon (Fort Worth, Texas) is launching Contoura Vision, the first personalized topography-guided LASIK platform approved by the U.S. Food and Drug Administration. But this is not a simple plug-and-play technology. According to experts, refractive surgeons must be dedicated to spending the time to learn the nuances, capabilities, and limitations of this system in order to offer patients the best visual outcomes.

Alcon began training a small subset of physicians on the topography-guided platform in December 2014. One of those physicians was Kerry Solomon, MD, Carolina Eyecare Physicians, Mt. Pleasant, S.C.

"The whole concept of topo-guided ablations makes sense to me," Dr. Solomon said. Although wavefront-guided treatments have been the gold standard and give patients excellent visual results, Dr. Solomon thinks that topo-guided treatments are better suited for patients who will eventually need cataract surgery or other procedures to treat their aging eyes.

"A topo-guided treatment also treats higher order aberrations, but it normalizes the corneal surface, so if the prescription of the eye were to change over time, now we're dealing with a more normal cornea and a more normal corneal shape," he said. A. John Kanellopoulos, MD, medical director, LaserVision Eye Institute, Athens, Greece, and clinical professor, New York University Medical School, New York, has been using this technology in Europe over the last 14 years, has published dozens of peer reviewed articles on topography-guided ablations, and proctored the first group of physicians performing the procedure in the U.S. Dr. Kanellopoulos pointed out that topo-guided treatments center treatment on the corneal apex, rather than the center of the pupil, and this could be one reason the procedure has had such good outcomes, which were confirmed in the recent large multicenter FDA study of topo-guided treatments.

"The outcomes [of the clinical trial] were, in my opinion, astounding, showing that topography-guided procedures had a much larger percentage of eyes gaining a line of vision—some gaining 2 lines of vision. I welcome the availability of this very effective technology for my patients in the U.S.," Dr. Kanellopoulos said. "I think this corresponds with several European investigators, including myself, who for many years have advocated for topography-guided treatments being superior to standard treatments, purely based on the fact that even 'normal' corneas are not perfectly symmetric, and some are not perfectly symmetric especially with regard to the corneal apex."

The FDA clinical trial compared outcomes of standard wavefront-guided procedures to topography-guided procedures in non-aberrated corneas. In that study, nearly 65% of eyes treated with topo-guided LASIK experienced 20/16 or better vision, according to a press release from Alcon.

"I think the benefits, if you look at the clinical trial data, are some of the best results I've ever seen on virgin eyes," Dr. Solomon said.

What to know before getting started

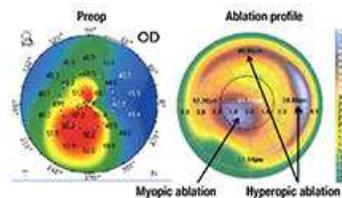
Alcon's Contoura system uses either the WaveLight Allegretto Wave Eye-Q Excimer Laser System or the WaveLight EX-500 Excimer Laser System together with the WaveLight Topolyzer VARIO Diagnostic System. In conjunction with an education partner, Alcon will provide a 4-hour training program required for surgeons who want to get started with this platform. Following the training, all participants will be qualified by Alcon clinical applications specialists to perform the procedure.

The Contoura system is currently indicated and approved only for myopic patients with or without astigmatism who have not had previous corneal surgery. Dr. Solomon recommends starting off with patients who have virgin eyes and normal corneal topography.

"If someone is looking to do topography-guided LASIK, I would recommend that they start out with normal corneas—virgin eyes—and get used to the process of how to take a topo-guided measurement," Dr. Solomon said. "As with most things in medicine, there's a lot of art to this science. There are nuances for the staff to learn how to take good measurements and for surgeons to understand when they are getting repeatable measurements," he said.

"I think topography-guided LASIK has a lot of potential for the right patients, provided we know when to accept good data, and when we have good surgical planning," he continued. "It's not cookie-cutter at all. It's a process. But provided we get all those things in order, patients are going to do very well."

David Lin, MD, FRCSC, medical director, Pacific Laser Eye Centre, and clinical associate professor, University of British Columbia, Vancouver, has been performing topo-guided ablations since 2001. He advises that when starting out, surgeons be very selective in choosing which patients to operate on. He said that topography-guided ablations make up only 2.3% of all the LASIK cases he performs. "It's a tiny amount because the regular wavefront-optimized LASIK results we found were better for normal eyes," he said. "If you have a normal eye, there's really no reason to do a topographic LASIK treatment." Dr. Lin only performs topo-guided treatments for decentered ablations, optical zone enlargements, patients with keratoconus or patients post-keratoplasty or radial keratotomy (RK). For most of these patients, however, he chooses to do PRK rather than



Corneal topography and ablation profile for a patient undergoing topography-guided PRK, showing the areas of myopic and hyperopic ablations
Source: Raymond Stein, MD, FRCSC

LASIK. "My philosophy is that if the eye is already asymmetrical and aberrated from weakening, in this case, they should not have LASIK because LASIK weakens the eye even more."

Although both topo-guided LASIK and PRK are available internationally, only topo-guided LASIK is FDA-approved at this time.

Another thing to keep in mind is that flap creation is slightly different for topo-guided ablations. "Topography-guided treatments will be centered on the visual axis, so they will take into account angle kappa by definition. Thus if the patient has significant angle kappa, flap-making has to adjust to that as well," Dr. Kanellopoulos said. "Usually a patient's angle kappa has a corneal apex that is skewed nasally and slightly inferiorly, so the same has to be done with the flap design and creation."

When to move on to irregular corneas

Drs. Solomon and Lin advised caution when deciding to move on to treating irregular corneas. Only when surgeons start getting good, consistent outcomes on normal eyes and the surgical process is streamlined should they start tackling irregular or previously treated eyes, Dr. Solomon said.

"In Europe and around the world, this technology has been extremely helpful for patients who have had previous refractive surgery, expanding the optical zone, treating irregular astigmatism, corneal irregularities, and decentered ablations," Dr. Solomon said. "There's certainly a lot of excitement about using topo-guided treatments to treat those eyes, but there's a lot that we still have to learn about that. It's not so cut and dry."

Dr. Lin has been performing topo-guided treatments for 15 years, but the majority of that time has been spent developing and perfecting an algorithm for calculating the correct treatment plan for each patient. The goal of topo-guided ablations is to normalize the corneal surface, but in irregular corneas, neutralizing all sphere and cylinder can actually induce an unplanned refractive error, he said. As an example, Dr. Lin found that setting a target of plano on a +4 D post-RK patient induced an 8 D myopic shift.

"Once you get into aberrated eyes, you cannot use a refraction without compensation," Dr. Lin said. "It's very dependent on the preoperative state of the eye. We figured out an algorithm to [correct] this, but it took us 5–10 years. For the average surgeon, they will have to be very careful to select the right patients."

The bottom line is that it takes years to become comfortable with treating highly aberrated corneas, Dr. Lin said. He thinks that surgeons should be comfortable after treating roughly 100 aberrated eyes, but these eyes are rare in a practice.

"The minute you include aberrations, the algorithm becomes very complex," he said. "So it takes dedicated surgeons to take courses on how to neutralize these corneas and then treat the refraction."

Despite these challenges, the physicians have been happy with the visual outcomes they have achieved with the technology. "The results have been spectacular," Dr. Solomon said. "I'm excited and thrilled to be able to offer this to patients."

Surgeons should contact their Alcon sales representative to learn more about getting started with the Contoura system.

Editors' note: Dr. Lin has financial interests with PRN (Plymouth Meeting, Pa.) and Schwind Eye Tech Solutions (Germany). Dr. Solomon has financial interests with Alcon. Dr. Kanellopoulos has no financial interests related to this article.

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AT A GLANCE

- Topography-guided LASIK is approved for treating routine myopia with or without astigmatism.
- Experts recommend starting out with normal eyes with fairly regular topography.
- Operating on irregular corneas requires compensating for the refractive shift induced by neutralizing the corneal aberrations.

