



John Kanellopoulos

# Good results for hyperopes with topography-guided LASIK with angle kappa compensation

Devon Schuyler  
in Las Vegas

TOPOGRAPHY-guided LASIK that compensates for angle kappa is a safe, predictable procedure for hyperopic patients, reported A John Kanellopoulos MD at the annual AAO meeting.

"We have traditionally treated hyperopia centred on the pupil. Because this is rarely the same as the visual axis, which is where refraction measurements are taken, most LASIK treatments are grossly decentred. I propose that this is the mechanism by which we're seeing significant regression, not because hyperopia is so difficult to treat," said Dr Kanellopoulos, Laservision Eye Institute in Athens, Greece.

He described a study that involved performing LASIK on 180 eyes with hyperopia using the 400 Hz Allegretto Wave Eye-Q excimer laser system (Wavelight), TopoLink software, and the single-use M2 microkeratome with large-cut ring (Moria). The Allegro Topolyzer (Wavelight) was used to define angle kappa. Treatment was centred on the visual axis instead of the centre of the pupil.

"The way this works with the laser is that you take eight topographies. The device and the software by default don't allow you to enter topographies of lesser quality than 75 per cent. The software blends the topographies, which are up to the surgeon's approval, and then the surgeon can adjust the cylinder, sphere, and axis," said Dr Kanellopoulos, who is also an associate clinical professor with the Department of Ophthalmology at the New York University Medical School.

Dr Kanellopoulos reported that the

results with this technique were "very satisfying". After 24 months of follow-up, the average sphere had improved from +3.08 D (SD +/-1.56 D) to -0.10 D (SD -0.75 to +0.75), and the average cylinder had improved from +1.80 (SD +/- 1.01 D) to 0.15 (SD +0 to +0.50). Uncorrected visual acuity improved from 20/78 to 20/33, and best spectacle-corrected visual acuity improved from 20/28 to 20/23. Higher order aberrations were reduced by 35 per cent, and contrast sensitivity improved by 25 per cent. The mean shift between months one and 12 was +0.32 D.

"The topography-guided platform achieves superior visual axis centration, with a small re-treatment rate compared with our previously published series," said Dr Kanellopoulos.

He concluded that topography-guided LASIK appears to be a safe and predictable procedure that reduces the chance of a surgeon-related decentration error. In addition, he commented that the technique produces less treatment-induced astigmatism than other LASIK techniques.

Dr Kanellopoulos attributed the high-quality results in this study to centring the treatments on the visual axis. He also mentioned that since the study, his group has switched from the Allegro Topolyzer to the Allegro Oculyzer, also known as the Oculus Pentacam.

"This technology is much faster and easier to use. But everything else is the same, as far as adjusting the sphere, cylinder, and axis."

"A lot of lasers that are available internationally give you the possibility of manually decentring your ablation. I consider this to be a very dangerous approach," he added.

Dr Kanellopoulos stressed that these study results support the idea that centring treatment on the visual axis should provide more accurate, better quality visual results.

He noted that angle kappa, defined as the angle between the visual and pupillary axis is an especially important factor for patients with hyperopia. In a study scheduled for publication in *The Journal of Refractive Surgery*, he and his co-investigators report that patients with hyperopia tend to have a larger angle kappa than those with emmetropia or myopia. This angle may cause alignment errors during photoablation, which is why a procedure that compensates for angle kappa has the potential to improve results for people with hyperopia.

Shachar Tauber MD, who was one of the session's moderators, told *EuroTimes* that topography-guided LASIK "shows great promise to address issues that have limited us in the treatment of hyperopia, and may indeed be a great tool for those corneas which are not perfect to start with." Dr Tauber is the director of ophthalmology research at St John's Hospital and Clinics, Springfield, Missouri, US.

However, he cautioned that no articles in peer-reviewed journals have shown topography-guided surgery to be superior to wavefront-guided surgery. He also pointed out "patients with dry eye, which appears to occur with greater frequency in hyperopes – as hyperopes tend to be older when they seek LASIK – may have errors on topography that must be considered."

Dr Kanellopoulos agreed with the above comment as far as the US published literature. There is significant and growing international bibliography on topo-guided treatments. Of course a wavefront guided

treatment would apply the laser by definition on the visual axis and not the centre pupil and is an approach to overcome the issue of angle kappa in hyperopes, he said. However, there are some problems with using wavefront-guided for that purpose:

1. By definition the wavefront measurement is taken with the pupil dilated and applied with the pupil much smaller opening significant bias for decentration error as has been shown in several recent articles.

2. The argument for topo-guided treatments solely for decentring angle kappa is that no other wavefront parameters are changed. The asphericity (spherical aberration or C7 in the wavefront language) invariably improves with the hyperopic treatments due to the peripheral flattening in contrast to myopic treatments. No laser treatment is applied in the centre 6.5mm of the corneal optical zone, reducing the possibility of changing for the worst some Zernicke coefficients – a common unfortunate iatrogenic occurrence with wavefront-guided treatments.

In addition, patients who have a significant amount of corneal irregularity (including decentration and scars from prior corneal surgery) may have measurement errors or have, in the case of scars, different ablation patterns. Finally, Dr Tauber pointed out that the position of the patient's head and the globe must be standardised in the topography unit.

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