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Treatment for myopia

Study compares wavefront-driven and conventional LASIK

Conventional LASIK with scanning slit excimer laser shows better outcomes in visual acuity, safety

By Cheryl Guttman

Reviewed by Paul J. Dougherty, MD

Los Angeles—Conventional LASIK for the treatment of myopia using the scanning slit excimer laser system (EC-5000, Nidek) affords visual acuity, predictability, and safety outcomes that are



Dr. Dougherty

comparable to—if not slightly better than—those achieved with Hartmann-Shack aberrometer-driven abla-

tions with other laser systems, according to the preliminary results of a retrospective study performed by Paul J. Dougherty, MD.

Dr. Dougherty, a clinical instructor, Jules Stein Eye Institute, David Geffen School of Medicine, University of California, Los Angeles, undertook a retrospective chart review of groups of eyes he treated with the EC-5000 laser (n = 51), CustomCornea (Alcon Laboratories) (n = 40), or CustomVue (VISX) (n = 83). The surgeries were performed during the same period. All eyes had ≤ -6 D of myopia with ≤ -1.50 D of cylinder, were treated for full distance correction, and had 1 to 3 months of follow-up.

The three groups were similar at baseline with respect to mean refractive error, cylinder, and best-corrected visual acuity (BCVA). Comparing outcomes of the three groups with respect to proportions of eyes achieving uncorrected visual acuity (UCVA) of 20/20 or better, a refractive error within 0.5 D of intended, and losing ≥ 1 line of BCVA, the results were consistent in numerically favoring conventional treatment with the EC-5000 scanning slit laser.

"The data from the FDA trials comparing wavefront-driven and conventional LASIK support manufacturers' claims about the superiority of custom ablations," Dr. Dougherty said.

"However, I am not convinced that wavefront-driven treatment is a quantum leap as some advertising suggests.

"Custom ablation works well, and I routinely offer it as an alternative because I believe it may have an advantage with respect to providing better night vision," Dr. Dougherty added. "On the other hand, this study indicates that in an unselected group of patients treated in the setting of routine clinical practice, comparable or even better outcomes can be achieved with non-wavefront driven scanning slit laser treatment."

Reports of non-FDA studies suggesting comparable outcomes could be achieved using conventional and wavefront-guided LASIK caught Dr. Dougherty's attention and led him to analyze his own experience.

In particular, he was impressed by a study from Dutch investigators [Nuijts RM, et al. J Cataract Refract Surg 2002;28:1907-1913] who treated fellow eyes of 12 patients with customized and conventional LASIK using Bausch & Lomb technology and reported standard LASIK resulted in better UCVA outcomes.

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Paul J. Dougherty, MD

"The various reports seemed consistent with my own impression that custom treatment was not providing dramatic differences," Dr. Dougherty said. "Considering the added time and cost involved with wavefront-driven

treatment, I wanted to look at the issue more carefully."

The cut-offs that he selected for maximum levels of myopia and cylinder were based on existing limits

for the various lasers studied. The maximum allowable myopia that can be treated using CustomVue is -6 D. And off-label, the CustomCornea system is used to treat up to 1.5 D of cylinder. There was no criterion for excluding patients based on BCVA, and the series included some patients who had loss of BCVA at baseline from amblyopia or other conditions. No patients experienced flap complications.

The results showed that UCVA of 20/20 or better was achieved in 72% of eyes treated with the EC-5000 laser, 68% of the CustomCornea-treated eyes, and 67% of the eyes in the CustomVue group. For those three treatment groups, corresponding rates of eyes with a refractive error ± 0.5 D of intended were 92%, 88%, and 87%. Rates of loss of 1 or more lines of BCVA were 8% in the EC-5000 group, 16% among the CustomCornea eyes, and 9% in the CustomVue group.

Due to the relatively small numbers of patients, Dr. Dougherty did not subject his data to statistical analyses. However, he is now expanding his series to include more cases and then will test treatment group differences for statistical significance.

In addition to providing not dramatically different outcomes, Dr. Dougherty pointed out that the wavefront-driven treatments are more expensive for the patient and surgeon and involve a lot more chair time in preoperative consultation and on the day of surgery.

He believes his failure to find a

Take-Home Message

A retrospective study of 174 eyes finds uncorrected visual acuity, predictability, and best-corrected visual acuity outcomes comparable or better after conventional LASIK using the scanning slit excimer laser (EC-5000, Nidek) compared with wavefront-guided CustomCornea (Alcon Laboratories) or CustomVue (VISX) treatment.

benefit of wavefront-driven treatment in this preliminary study reflects the limitations of the Hartmann-Shack aberrometers used to acquire the wavefront maps in the Alcon and VISX systems.

"The Hartmann-Shack systems are first-generation technology," he explained.

"They involve a lot of extrapolation of data and can suffer problems from positional crossover of light, measurement in eyes with any lenticular opacity, and acquisition in highly aberrated eyes, which are the ones that one would most want to treat with a customized ablation."

In contrast, he is excited about the Nidek aberrometer (OPD-Scan), which can be used for wavefront treatment in some countries outside of the United States. Based on the principle of dynamic skiascopy, it uses 1,440 points of infrared light in contrast to the 200 points of visible light used in the Hartmann-Shack systems. By virtue of that difference, the Nidek instrument overcomes many of the problems associated with the Hartmann-Shack technology.

"I think that wavefront-treatment guided by output from the dynamic skiascopy aberrometer will lead to better outcomes that will allow us to start talking more routinely to our patients about 'supervision,'" Dr. Dougherty said. ○

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