Wavefront-guided LASIK improves visual acuity in eyes

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"I think that wavefront-guided LASIK may be a recommendable way for touch-up because it may be able to avoid a decrease of contrast sensitivity," lead author Kunihiko Nakamura, MD, OSN Asia-Pacific Edition Editorial Board Member, said in an interview with Ocular Surgery News.

Wavefront-guided ablation required more precise ablation, a factor that reduced higher-order corneal aberrations and helped to maintain contrast sensitivity, Dr. Nakamura said.

"Not conventional LASIK but wavefront-guided LASIK can preserve contrast sensitivity," he said. "Wavefront technology minimizes the increase of higher-order aberrations following corneal refractive surgery. It results in preservation of contrast sensitivity following enhancement."

Dr. Nakamura presented study results at the American Society of Cataract and Refractive Surgery meeting in San Francisco, U.S.A.

LASIK enhancement

The prospective study included 10 eyes of eight patients with a mean age of 56.6 years who underwent wavefront-guided LASIK to correct refractive error after implantation of the Tecnis multifocal IOL (Abbott Medical Optics).

LASIK was performed 3 months or later after IOL implantation. The Amadeus microkeratome (AMO) was used to create LASIK flaps in eight eyes; the IntraLase femtosecond laser (AMO) was used to create flaps in two eyes. Ablation was performed with the VISX Star S4 excimer laser (AMO).

Mean refractive correction was 0.45 ± 0.81 D of sphere and 1.17 ± 0.82 D of cylinder. Mean ablation depth was 22.4 ± 5.4 µm, Dr. Nakamura said.

Flap creation method influenced visual outcomes. However, femtosecond flap creation proved slightly more advantageous for wavefront-guided ablation.

"There is no difference between femtosecond and microkeratome flap creation, as far as visual outcomes," he said. "But femtosecond can create thinner and secure enough diameter of the corneal flap. Wavefront-guided LASIK needs a higher amount of tissue ablation and a wider corneal flap. At this point, femtosecond flap creation has an advantage."

Visual acuity and contrast sensitivity

Full ocular examinations were performed before and after LASIK treatment. Primary outcomes included spherical equivalent, distance and near visual acuity, and contrast sensitivity.

Results showed pre-LASIK spherical equivalent of 0.7 D and post-LASIK spherical equivalent of 0.23 D.

Pre-LASIK cylinder was –1.2 D; post-LASIK cylinder was –0.58 D. The differences were statistically significant (P < .01), Dr. Nakamura said.

Pre-LASIK uncorrected distance visual acuity was 0.6, and post-LASIK uncorrected distance visual acuity was 0.93; the difference was statistically significant (P < .01). Corrected distance visual acuity was 1.19 before and after LASIK.

Uncorrected near visual acuity was 0.52 before LASIK and 0.8 after LASIK; the difference was statistically significant (P < .01). Distance-corrected near visual acuity was 0.82 before LASIK and 0.86 after LASIK. Pre-LASIK corrected near visual acuity was 0.89; post-LASIK corrected near visual acuity was 1.0.

Results showed no significant change in contrast sensitivity after LASIK.

Increased ablation depth may result in corneal aberration, which may further decrease contrast sensitivity, Dr. Nakamura said.

“The deeper ablation induces stronger corneal aberration. Thus, the amount of ablated tissue should be minimized, even with wavefront-guided LASIK,” he said.

A previous study showed that conventional LASIK increased higher-order aberrations, Dr. Nakamura said. Another study showed that although safe and effective in eyes with diffractive IOLs, wavefront-guided LASIK did not improve higher-order aberrations. – by Matt Hasson