

Software aims to reduce astigmatism after LASIK

Clinical research is under way using the software to reduce lower-order aberrations.

by Lou Koury
Correspondent

MELBOURNE, Australia — Vector planning combined with wavefront analysis is being studied as a method to reduce astigmatism remaining after LASIK.

"The goal is to overcome the emerging problem of lower-order astigmatic aberrations that persist after treatment using wavefront-guided techniques," said Noel A. Alpines, MD, director of



Noel A. Alpines

NewVisions Clinics here. Dr. Alpines is heading clinical research taking place at his clinic, which also consists of modifications to his ASSORT vector-planning software.

During LASIK that concurrently treats a spherical and astigmatic refractive error, the ablation pattern provides a relatively greater amount of steepening in the flatter corneal meridian, Dr. Alpines explained.

"The reason including vector planning reduces corneal astigmatism by a greater amount than conventional or

wavefront technique alone is that the meridian of maximum ablation is more closely aligned to the principal corneal meridian," he said.

"It would be expected that reduced corneal astigmatism would result in less second- and third-order aberrations. This could be quantified by postoperative wavefront analysis examination," he added.

How the software works

The ASSORT software Dr. Alpines is developing works as a standalone program into which separate values for corneal astigmatism and spherocylindrical refraction are entered, he explained.

"Performing vectorial calculations for LASIK treatment requires two sets of values to achieve an optimal treatment plan. This way the second-order aberrations associated with the spherocylindrical error are treated at a magnitude and a meridian that lies somewhere between the differing corneal and refractive values," he said.

There are no previous data comparing wavefront refraction treatments alone vs. wavefront treatment using the ASSORT vector planning techniques, Dr. Alpines said.

Vector analysis and outcomes

Dr. Alpines cited data presented at the American Society of Cataract and Refractive Surgery in Philadelphia earlier this year that reviewed conventional LASIK performed with the Visx Star laser. Researchers examined these outcomes using vector analysis to determine the effectiveness of the astigmatism treatments.

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tion of astigmatism was performed over and above what is available on the laser's factory settings," Dr. Alpines said.

"In the case of these hyperopic patients, this factor of 1.30 adjustment provided a full and complete correction of the astigmatism magnitude, and this occurred with refractive and corneal outcomes," he added.

He emphasized that any shortfall in the complete correction of astigmatism among these patients was due to alignment and healing factors.

For patients with myopic astigmatism undergoing LASIK with the Visx Star laser, a similar factor of 1.30 adjustment was made. This is in comparison to the machine's standard setting, which is factored by 1.20, he said.

"In this series of 864 patients, myopic astigmatism treatment still resulted in some level of undercorrection in the range of about 10% or 15%," Dr. Alpines said.

This suggests that additional astigmatic correction over current standard Visx settings would be beneficial, he said.

Using the ASSORT software

To use the ASSORT system, the surgeon first needs to identify the best possible measured values for corneal and refractive astigmatism, Dr. Alpines explained. For corneal astigmatism, this is best achieved by the simulated keratometry value of corneal topography.

"But this value should be checked against corneal keratometry to ensure that this reading is the best representation of the cornea," Dr. Alpines said.

"The refractive astigmatism values provided by the wavefront analysis spherocylindrical value measuring the second-order aberrations is the value that represents refractive astigmatism," he continued.

This value should also be checked against the patient's manifest refraction to ensure that it also best represents the refractive astigmatism value, he said.

The ASSORT software is unique in that it contains the patented Alpines methodology for planning and examining outcomes of refractive surgery. According to Dr. Alpines, ASSORT is a "comprehensive approach to refractive surgery treatments, outcomes and nomogram refinement."

Correct irregularity simultaneously

Using the ASSORT program, surgeons have the ability to correct any remaining corneal irregularity during the same LASIK procedure, which could result in enhanced visual outcomes, Dr. Alpines said.

"It is anticipated that this might achieve potential improvement of vision beyond the patient's preoperative best-corrected visual acuity," he said.

He explained that this project ultimately seeks the successful merging of diagnostic (corneal topography and wavefront analysis) and therapeutic (laser) aspects of refractive surgery to provide an integrated approach.

"This is particularly relevant for the effective treatment of astigmatism as a part of the overall spherocylindrical correction," Dr. Alpines said.

Wavefront technology has made it possible to accurately quantify higher-order aberrations in addition to the spherocylindrical refractive error, he said.

"However, using wavefront values alone to treat these aberrations has shown some propensity for lower-order (second and third) astigmatic aberrations to persist," he said.

Dr. Alpines said he hopes ongoing research will result in techniques and tools to reduce this phenomenon. **OSN**

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