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Study finds that combined refractive treatment reduces astigmatism more than wavefront alone

Using combined wavefront treatment and topography with vector planning for laser vision correction showed greater reduction in corneal astigmatism and better visual outcomes, which could lead to improved patient satisfaction.

"We took what we had as the most advanced treatment, created a new advance on technique, which is combining topography, and showed that you can do that physically while demonstrating better results," **Noel A. Alpins, FRANZCO, FRCOphth, FACS** said.

Noel A. Alpins

This was the first study to combine topography and refractive/wavefront preoperative data for astigmatism treatment in laser vision correction. The study looked at 21 eyes of 14 patients divided into two groups in a prospective, double-masked study. One group was treated by wavefront parameters alone. The other group was treated with wavefront combined with topography values using vector planning.

The combined group had a greater reduction in horizontal coma, which was a key parameter. Mean gain in low-contrast visual acuity under mesopic conditions was 0.06 in the wavefront-only group and 0.11 in the combined group.

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Combined refractive treatment reduces astigmatism more than wavefront alone

Measuring ocular residual astigmatism also assists in achieving best visual results in eyes undergoing refractive surgery.

Using combined wavefront treatment and topography with vector planning for laser vision correction showed greater reduction in corneal astigmatism and better visual outcomes, which could lead to improved patient satisfaction.

"In the small group of patients that we studied, we actually demonstrated trends in the visual and aberrometry results for better outcomes using the combined technique than treating by the conventional wavefront aberrometry alone, which is the most advanced treatment that we have today in laser vision correction," OSN Europe/Asia-Pacific Edition Board Member, **Noel A. Alpins, FRANZCO, FRCOphth, FACS,** told OCULAR SURGERY NEWS.

In a telephone interview, Dr. Alpins and co-author **George Stamatelatos, BScOptom,** said this was the first study to combine topography and refractive/wavefront preoperative data for astigmatism treatment in laser vision correction. The study was published in the *Journal of Cataract and Refractive Surgery.*

"We took what we had as the most advanced treatment, created a new advance on technique, which is combining topography, and showed that you can do that physically while demonstrating better results," Dr. Alpins said.

The study looked at 21 eyes of 14 patients divided into two groups in a prospective, double-masked study. One group (11 eyes) was treated by wavefront parameters alone. The other group (10 eyes) was treated with wavefront combined with topography values using vector planning.

The Visx Star S4 CustomVue software (Abbott Medical Optics) was used to perform treatments in both groups. For the combined group, the treatment profile was calculated with simulated keratometry readings from Humphrey Atlas (Carl Zeiss Meditec) topography and second-order Zernike coefficients defocus 4 and astigmatism 3 and 5 from the WaveScan wavefront (AMO) display of the eye, according to the study.

Because no laser machine could combine the treatments, Dr. Alpins and Mr. Stamatelatos worked with AMO to create individualized treatments for each of the 10 combined cases.

"It's a long and arduous process to have each patient's treatment calculated and designed," Dr. Alpins said. "It's probably the ultimate customized process — this is the true customization of astigmatism treatment."

Gaining insight

The study's results were positive but had no statistical significance, Dr. Alpins said. He and Mr. Stamatelatos wanted only to gain insight into trends that could be pursued by other physicians and companies.

Preoperatively, the mean corneal astigmatism was 1.07 ± 0.54 D in the wavefront-only group and 1.50 ± 0.87 D in the combined group. At 6 months, corneal astigmatism was 0.67 ± 0.57 D, or a 39% reduction, in the wavefront-only group, and 0.83 ± 0.55 D, or a 44% reduction, in the combined group.

Noel A. Alpins

The combined group also had a greater reduction in horizontal coma, which was a key parameter, Dr. Alpins said. Mean gain in low-contrast visual acuity under mesopic conditions was 0.06 in the wavefront-only group and 0.11 in the combined group.

"Patients with combined treatment with vector planning had better visual results under mesopic conditions, both low and high contrast," Mr. Stamatelatos said.

Ocular residual astigmatism

In addition to excellent results with the combined treatment, the study also showed the importance of the parameter of ocular residual astigmatism in vector planning, which is one of the key parameters in determining astigmatism to achieve best final visual results, Dr. Alpins said.

"The ocular residual astigmatism has not in the past been adequately addressed," he said. "If it is adequately addressed, then the group of patients who are unhappy with laser surgery are probably going to disappear, and the proportion of patients who are happy with surgery will increase close to the level of 100%. It is the key element and a major fundamental next step in achieving what we would call the perfect laser vision correction outcome."

– by Erin L. Boyle

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