

Corneal topography data enhance astigmatic outcomes

By using corneal topographical information and reconciling it with the refraction, surgeons can enhance the visual outcomes of refractive procedures.

MELBOURNE, Australia – If refractive surgeons use the information available through corneal topography, they will achieve more favorable results, with less astigmatism, than if they rely solely on refractive data, said **Noel Alpins, MD**. “Optimizing the treatment according to both refraction and topography [achieves] a better visual outcome,” said Dr. Alpins, the medical director of New Vision Clinics and a member of the Melbourne Excimer Laser Group.

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— **Noel Alpins, MD**

“When we treat by refraction, [the greatest astigmatic change occurs along] the steepest power axis of the refraction,” Dr. Alpins said. “If you treat by topography, the steepest topographical axis will be maximally flattened. The optimal axis for treatment lies between these two meridians.

Integrating data

“Most manufacturers recommend, and most surgeons treat, by the spectacle values alone, whether addressing the spherical or the cylindrical correction,” he continued. “The technique I favor employs the process of optimization, which incorporates the corneal shape or topography into the plan.”

The technique of optimization is relevant to any laser that can treat astigmatism, Dr. Alpins said, and can also be used with the surgical techniques of laser in situ keratomileusis (LASIK) and photorefractive keratectomy (PRK).

In a recent study, 97 eyes were randomized to two groups: one treated by refractive data alone and the other treated “optimally,” or by integrating the refractive and topographical data. “The optimally treated eyes showed a better

uncorrected visual acuity, with less remaining corneal astigmatism, measured both by keratometry and topography,” said Dr. Alpins.

The mean age of the patients was 41 years, with almost equal distribution between males and females. To qualify for the study, the patients’ myopic spherical equivalent was required to be between -1 D and -10 D. The amount of refractive astigmatism required was at least 1 D.

The calculated difference in the results between the two methods for any eye to be considered for the study had to be at least 0.25 D to be included, so it would at least be measurable with a keratometer, Dr. Alpins said. Approximately two-thirds of the patients have been seen at 12-month follow-up. Of the patients observed at that time, 47% of the refraction group had a visual acuity of 20/25, while 50% of the optimal group had this level of acuity. For visual acuity of 20/40 or better, the results were 63% for the refraction group and 76% for the optimal group. The groups had equivalent results when tested for best corrected visual acuity; both had two eyes that had lost more than two lines of best corrected visual acuity, primarily due to haze. When refractive results were compared, 53% of the refraction group and 69% of the optimal group had ± 1 D of refraction. For ± 2 D, the results were 80% for the refraction group and 87% for the optimal group. Haze grades between the two were equivalent.

“When you treat closer to the topographical axis, you would expect less corneal astigmatism,” Dr. Alpins said, “and this is what we found. However, a bonus for the patients in the study was that there was no increase in refractive astigmatism remaining in the optimally treated group.” Dr. Alpins noted, however, that although the groups’ results differed, the difference was not statistically significant in the patients analyzed so far.

Objective measurements

Dr. Alpins discussed further implications of the study’s findings. “When you do a measurement, whether it be by topography or keratometry, you get an objective astigmatism value,” he said. “However, when you do a measurement by manifest refraction, it’s a test performed subjectively between the examining person and the patient. When people treated for myopia travel from a spherical equivalent of -5 D or -7 D to plano, everybody gets excited about the improvement in unaided vision. In this situation keratometry and topography give an objective assessment of the prevailing astigmatism and provide additional and potentially more accurate values for an astigmatic analysis than depending on refractive astigmatism values alone.

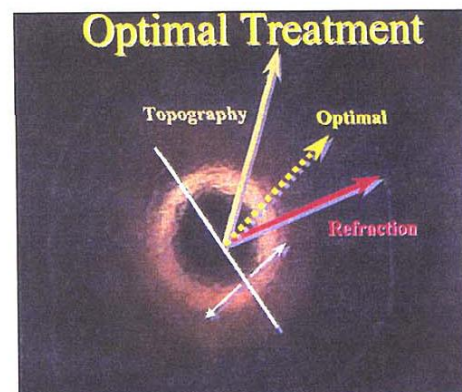
“The study demonstrates,” he continued, “the advantages of using information derived from topographic data both before and after treatment. This can benefit the patient by providing an overall improvement in results obtained with refractive surgery.”

In this study Dr. Alpins used the Visx (Santa Clara, Calif.) Laser Twenty/Twenty B.

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Optimal treatment axis is calculated using astigmatism information from both corneal topography and refraction.