

Software links excimer to topography

The software enables separate guidance for sculpting the two halves of the cornea. A map provides asymmetrical treatment to corneas with varying astigmatisms.

by Rochelle Nataloni
Staff Writer

MELBOURNE, Australia — Noel Alpíns, MD, has created the missing link between excimer laser and corneal topography machine.

"The newly developed module for the device application software ASSORT provides a linkage so that refractive laser and corneal topography machines can function in an integrated fashion," Alpíns told OCULAR SURGERY NEWS. "It enables you to determine the optimum treatment by getting the best balance between topography and refraction," he said.

Recognizing the differences

Alpíns' recent software innovation stems from the recognition that most corneas are irregular to some extent. "Until now, we have been treating patients as if both hemi-divisions of the cornea were identical, but they are not. It is time to start asking, 'What are we going to do about it?'" Alpíns said.

One modality renders optimal treatment, Alpíns said, because the software enables separate guidance for sculpting the two halves of the cornea. The program provides a map to help the surgeon provide asymmetrical treatment to corneas with, for instance, varying amounts or orientations of astigmatism. "This is possible with most refractive laser systems," Alpíns said.

Topography machines, at this point, are sophisticated keratometers, Alpíns said. "They are going to have to start putting out two simulated keratometry values, each representing the shape of one-half of the cornea. When you have these two values, then you can start looking at treating each half of the eye separately," Alpíns said.

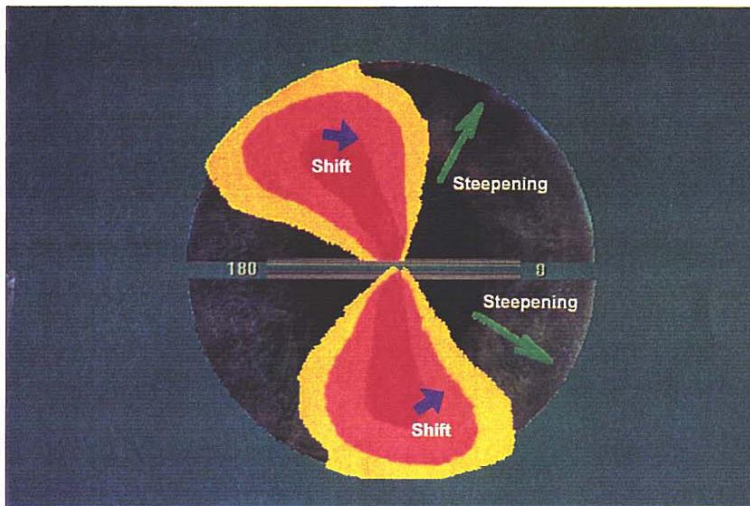
Programming lasers

The software makes use of information provided by topography that previously went unused. "We can now program lasers in a sophisticated way," Alpíns said.

The ASSORT program module uses colored lines of varying hues and lengths to illustrate astigmatism and other corneal variations. The surgeon interactively proposes a desired shape, and the software calculates the necessary treatment parameters. "I call it 'Designer Cornea' because you can create whatever shaped cornea you want," he said.

Of course, the surgeon can simply aim for a maximum amount of astigmatism reduction treating optimally. But the Designer Cornea system provides alternatives. The surgeon can decide just how much astigmatism will provide the patient with the visual acuity with which he or she will be happy.

"In the end, the patient is going to get a much more acceptable image on his or her retina," Alpíns explained.



A noteworthy feature of the software is that it can program the laser to correct astigmatism to a regular state, that is orthogonal and symmetrical, whatever configuration the patient or surgeon desires, even with no refractive change.

"We have a surgical analysis system that incorporates predictive topography mapping capabilities into the laser treatment hardware to direct it."

— Noel Alpíns



Poorly constructed

"We have all experienced distorted images through a poorly constructed mirror or lens, as well as more acceptable images through one that is well crafted," Alpíns said. "In this same manner, one would expect a clearer transmission of light through a cornea with regular astigmatism than through one with some amount of irregularity, such as the presence of either non-orthogonal or asymmetrical components or both."

Possibilities

The program is designed to be housed within a topography or laser machine. Alpíns is currently discussing possibilities with several corneal topography and laser manufacturers. "We have a surgical analysis system that provides the means to incorporate predictive topography mapping capabilities into the laser treatment hardware in order to accurately direct it," Alpíns

said. "The software programs the laser so that you can, in real time, alter the intended shape of the cornea. It is simple and interactive to operate," he said.

A noteworthy feature of the software is that it can program the laser to correct astigmatism to a regular state that is orthogonal and symmetrical, whatever configuration the patient or surgeon desires, even with no refractive change.

"In this case, you are applying the laser to two spots on the cornea, applying torque equally hard in the opposite cyclical directions so they cancel each other on the refraction, but they are reshaping the cornea into a regular state," Alpíns said.

Alpíns suggested that this can potentially revolutionize and expand the capabilities of refractive surgery. The potential is there for laser surgery to enhance the vision of an eye, whether spectacles are worn or not, without changing the eye's refractive state.

The program also provides a quantitative value for topographic disparity; that is, a vectorial message of how irregular the cornea is, both pre- and postoperatively. "If the topographic disparity is zero, then the corneal astigmatism would be perfectly regular," Alpíns said.

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