

# Keratoconus and LASIK

Ambiguity has no place in keratorefractive surgery.

BY LEE T. NORDAN, MD



In June, I attended the Storm Eye/ASCRS Clinical Update at Kiawah Island, South Carolina. I always find this meeting—organized by Kerry Solomon, MD—to be informative and exciting. This year's offering was no different, but I was not satisfied by the panel's handling of keratoconus, forme fruste keratoconus, and keratorefractive surgery.<sup>1</sup>

The debate was lively, the panelists (of which I was one) were quality experts who had legitimately varying points of view, and the audience was engaged. The presentation therefore should have been a great success. For me, it was not. Once the presentations and debate had concluded, there was little coherent, consensual, clinically usable information with respect to diagnosing mild keratoconus, identifying potential forme fruste keratoconus, and deciding whether or not to perform LASIK or PRK on a given cornea.

Telling audience members, "just look at all the parameters and tests, and you'll get a feeling about a certain cornea," is not particularly helpful in my opinion. Refusing to decide which information is valid and which should be disregarded is allowing "voodoo" to creep into the diagnosis of keratoconus and forme fruste keratoconus.

This article is therefore dedicated to providing what I hope are some straightforward, clinically useful concepts concerning keratoconus and keratorefractive surgery. When they are considered together, I believe that surgeons will have a clearer, more informed picture of how to proceed with the diagnosis and treatment of keratoconus.

## IRREGULAR ASTIGMATISM

Even without subjective complaints by the patient, the most subtle indication of irregular astigmatism in a cornea that appears to be normal at the slit lamp should prompt the examiner to consider and investigate the diagnosis of keratoconus.

## TOPOGRAPHY, KERATOMETRY, AND PACHYMETRY

Automated topography often shows keratometry axes that differ from orthogonal by approximately 10°. These corneas can be normal or mildly keratoconic. Surgeons

should acknowledge this major weakness of automated topography. The strength of automated keratometry is that, if it indicates a steeper "hot spot" (no matter how subtle), the cornea may have mild keratoconus, and irregular astigmatism is present no matter what the keratometry axes show. The contour of automated topography is more meaningful than the mild variation of keratometry axes between the 3-, 5-, and 7-mm optical zones.

If automated topography indicates questionable, subtle irregular astigmatism, then the clinician should use a manual keratometer to decide whether or not irregular corneal astigmatism is present.

Forme fruste keratoconus is a condition in which stromal strength is below normal and no irregular astigmatism is present, but irregular astigmatism will develop if the cornea is weakened by LASIK. Identifying such corneas is difficult and certainly not an exact science, but a consistent approach would be helpful.

For me, a central corneal thickness of 505µm or less indicates the likely presence of forme fruste keratoconus. The keratorefractive surgeon must then decide if the risk of LASIK is appropriate in light of the surface ablation techniques available. Of course, some thin corneas can withstand LASIK, but many others will not. It is a judgment call.

Keratometry readings in the neighborhood of 47.00D or high astigmatism near 6.00D without any evidence of corneal irregular astigmatism indicates appropriate candidates for LASIK.

## CORNEAL PELLUCID MARGINAL DEGENERATION

Corneal pellucid marginal degeneration and keratoconus are probably the same disease process except that the area of maximal thinning in the former occurs more peripherally than in the latter. In order to identify potential corneal pellucid marginal degeneration without changes in automated topography, it can be useful to compare pachymetry readings at the 7-mm optical zone with ones taken of the central cornea. If the thinnest peripheral pachymetry reading is equal to the central pachymetry measurement, then the surgeon should

consider PRK. In my experience, a difference of 20 $\mu$ m or more is common in normal corneas, however.

### THE POSTERIOR FLOAT AND INFERIOR/SUPERIOR COMPARISONS

The corneal posterior float and Rabinowitz's inferior/superior dioptric comparison are not diagnostic in identifying forme fruste keratoconus or subtle keratoconus. The contour of the automated topography is much more telling.

### SUMMARY

The keratorefractive surgeon must first decide if irregular astigmatism is present by means of automated topography and then manual keratometry if the results are questionable. In an eye with significant irregular astigmatism, LASIK may not be the appropriate procedure, but PRK is an option, depending upon the philosophy of the surgeon.

"In an eye with significant irregular astigmatism, LASIK may not be the appropriate procedure."

If automated topography (with appropriate sensitivity) shows a mild "hot spot," the central cornea is thin, or the peripheral cornea is not thicker than the central cornea, the surgeon should recognize the possibility of forme fruste keratoconus and consider performing surface ablation rather than LASIK.

Certainly, my colleagues from the panel convened on Kiawah Island will have their own ideas on this subject. It seems to me, however, that we should be able together to simplify and improve the clinical utility of our communal experiences. I invite my fellow panelists to read this article and share their ideas with me, and I will report in a future column on whether a fair degree of common ground was found with respect to providing clinically useful information to our keratorefractive colleagues. ■

*Lee T. Nordan, MD, is a technology consultant for Vision Membrane Technologies, Inc., in San Diego, California. Dr. Nordan may be reached at (858) 487-9600; laserltn@aol.com.*

1. Solomon KD, Holland E, Lane S, et al. Corneal refractive surgery hot topics. General session presented at: The Storm Eye/ASCRS Clinical Update 2006 meeting; June 1, 2006; Kiawah Island, SC.