The use of corneal topography and a new staining technique to measure incision depth in keratotomy

Miles H. Friedlander, MD, FACS
Kurt A. Buzzard, MD, FACS
Luis E. Remus, III, PhD
Brad J. Evans, MD

Current methods of evaluating changes in corneal surface are based on Placido disc technology. In currently available corneal topography systems, a flat cornea is represented by a large central circle, widening of the light and dark rings, and increased distances between the light and dark areas. Conversely, steep corneas effect the captured image by projecting a small central circle, decreased distance between the light and dark areas and narrowing of light and dark rings.

Regular asphericity produces un ovoid rother than round image. This is especially evident in the central ring. In irregular astigmatism, the smooth corneal surface is disrupted and is depicted by disjointed and irregular Placido imagery.

Recent advances in computer hardware and software have refined the simple Placido technology into highly sophisticated systems capable of providing complex data to both the researcher and the clinician. This information is typically translated into color coded maps which represent the various curvatures of the corneal surface. Unfortunately, these systems provide very little information about surface elevations and depressions, viz localized incision depth.

We have developed a method which uses these computerized topography systems to indirectly measure incision depth. We based our approach on the principle that keratotomy incisions wil flatten the cornea at the site of the incision. Thu the deeper the incision, the greater the degree o corneal flattening over the site of the incision.

We used whole cadaver eyes, unsuitable fo corneal transplantation, to make radial cornea incisions of varying depths. Each globe wa analyzed with the *Eye Sys photo imaging system* We found that the color coded topographical map accurately recorded the degree of flattening pro duced by each incision, and thereby indirectl reflected individual incision depths. Variou illustrations of this phenomenon will be presented

In the past, the depth of keratotomy incision was generally measured by making cross section at various points along the incision. The obviou disadvantage of this method is the disruption o the tissue and the inabillity of viewing the incisio in its entirety. We have developed a method o confining staining to only that portion of th cornea that has been incised by the keratotom blade (Carbofucin). Subsequently the tissue is fixe (Bolin's solution) for several minutes. We the section the incision along its entire length. Thi technique provides visualization of the staine keratotomy incision in its entirety and enable accurate measurement of the incision depth at an point along the wound.