In recent years, sutureless clear corneal incisions have become increasingly prevalent in cataract surgery. Although this approach offers various advantages compared to scleral tunnel incisions, clear corneal incisions have also been associated with increased rates of postoperative endophthalmitis.\(^1\)\(^,\)\(^2\) In addition, recent studies such as that of Peter McDonnell, MD, using India ink\(^3\) have suggested that sutureless clear corneal cataract surgery allows the ingress of fluid into the anterior chamber. Even the most well-constructed wounds are prone to this defect.

Sutures were the standard of care in the past, but they are problematic for several reasons. In addition to their cost, their placement can induce astigmatism, and it can be time consuming for the surgeon and uncomfortable for the patient. Moreover, sutures are not necessarily impervious to leakage. A recent study found that the rates of postoperative wound leak and anterior chamber reaction in phacoemulsification surgery were the same for sutured and sutureless corneal incisions.\(^4\) All of these factors underscore the need for a material that can seal the wound in a comfortable, timely fashion, and prevent both the ingress and egress of fluid from the ocular surface. Ideally, this material would dissolve and would not affect visual function. A new ocular bandage represents a step in the right direction.

**TRADITIONAL ADHESIVES, NEW POLYMERS**

For several years, research into polymers to seal corneal wounds has been underway in the United States and abroad. Cyanoacrylate, one such adhesive material, has long been used to protect leaking corneal wounds caused by perforated ulcers. This material does not dissolve on its own, however, and has been found to cause irritation or discomfort for patients.

Polyethylene glycol (PEG) polymers are among the newer materials being tested for sealing corneal wounds. Biocompatible PEG polymers form the same type of hydrogel used in contact lenses and are administered to the eye as a liquid at the conclusion of surgery. Within about 30 seconds, the liquid polymerizes into a soft material that adheres to the ocular surface and forms a bandage. One such polymerizing liquid hydrogel compound is the ReSure Adherent Ocular Bandage (Ocular Therapeutix, Inc., Bedford, MA). A similar product, OcuSeal Liquid Ocular Bandage (BD Medical, Waltham, MA), was recently released in Europe.

**FDA STUDIES**

The ReSure bandage was the subject of one FDA study investigating its use as an ocular bandage. In this phase 3 trial, the product was found to be safe and well retained on the eye. Typically, the material remains in place for 3 to 7 days. As an ocular bandage, the PEG polymer is as close to ideal as anything developed to date.

The FDA has requested another study comparing the sealing properties of ReSure to those of sutures in cataract surgery. A method of testing has been developed in which the ocular surface is challenged in a very controlled manner, similar to the pressure exerted on the...
eye by a finger or a bottle of eye drops. The study will evaluate the ability of the wound to withstand these challenges.

OTHER LABORATORY STUDIES

Although ReSure has not been tested in FDA trials as a sealant, laboratory studies have investigated its use for this purpose. I essentially replicated Dr. McDonnell’s study ex vivo using animal eyes to test fluid ingress and egress in unsutured eyes and ones sealed with the polymer material used in the ReSure bandage. In the unsutured control group, there was ingress and egress of ocular surface fluid into and out of the eye, very similar to the results of Dr. McDonnell’s study. In the sealed group, there was virtually no ingress or egress of fluid.

IMPACT ON CLINICAL PRACTICE

In my practice a few years ago, I evaluated the refractive outcomes of patients implanted with the Crystalens (Bausch + Lomb, Rochester, NY). I found that one-third of my cataract wounds, despite appearing well sealed, leaked slightly when measured by a Seidel test. These leaks were otherwise undetectable. When I compared the results of the Crystalens patients who had almost-undetectable Seidel-positive leaks with those who had no leakage, I found that the former experienced, on average, a refractive shift of 0.50 D of myopia. This suggests that a corneal incision that is not properly sealed can have a meaningful effect on the outcome of IOL surgery.

The availability and use of a material that seals wounds safely, effectively, and comfortably should significantly improve cataract surgical outcomes. I look forward to monitoring closely the progress of studies of these new polymers to see if they might meet that need.

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