Frank A. Bucci, Jr, MD

Constructing a watertight, clear corneal cataract incision is mandatory to ensuring a stable anterior chamber without hypotony. In addition, it has recently been suggested that clear corneal incisions have contributed to the rising incidence of endophthalmitis over the past decade. Some clinicians have proposed “retreating” to using scleral tunnels with sutures exclusively instead of clear corneal incisions with a suture when indicated on occasion. In the mid-1990s, when the complication rate related to phacoemulsification was higher than acceptable, the ophthalmic community’s response was to better educate the beginning phaco surgeon instead of retreating to the extracapsular technique. I suggest we take a similar approach now, because clear corneal incisions do not cause endophthalmitis; rather, poorly constructed clear corneal incisions that leak contribute to the complication.

My preferred technique for achieving a watertight seal at the time of phacoemulsification is to construct a clear corneal incision with three planes. After placing viscoelastic in the anterior chamber through the paracentesis site, I use a diamond blade with its footplates set at a depth of 370µm to create the first plane. This straight corneal groove is approximately 3mm in length and is located just inside the clear cornea.

I create the second plane with a trapezoid diamond blade, which contains a progressive width of 2.6 to 2.9mm. I place the tip of the trapezoid blade in the bottom of the groove and tip it upward so the path of the blade is parallel to the curvature of the peripheral cornea. The blade progresses through the clear cornea for a length of approximately 1.50 to 1.75mm. Performing this step requires excellent visualization of the diamond blade’s tip.

The final step begins with my changing the angulation of the trapezoid diamond. I point the tip of the trapezoid diamond to the theoretical center of the lens, and the keratome fully penetrates the clear cornea into the anterior chamber. My opposite hand provides countertraction by placing the second instrument in the paracentesis site, which is 3 clock hours clockwise to the temporal wound. At the completion of the procedure, all clear corneal incisions receive stromal hydration. A flat, 27-gauge cannula fits nicely into an appropriately constructed incision. I challenge the watertight seal of the wound with a dry Weck-Cel sponge (Medtronic Xomed Ophthalmics, Inc., M inneapolis, MN) and/or the 27-gauge cannula. I prefer to leave the eye somewhat firm, which I believe enhances the self-sealing-valve nature of the three-planed incision.

Paul H. Ernest, MD

A secure cataract incision is based on three components: (1) geometry; (2) the incision’s location; and (3) the instrument’s distortion of ocular tissue during microincisional cataract surgery.

A square wound with an adequate corneal component is the most secure incision that one can create, as demonstrated by laboratory studies in cadaveric models and living animal models. Studies in both models have shown that the endothelial pump plays no role in the wound’s stability. The fact that there have been so many reports of endophthalmitis with nonsquare incisions but not with square incisions is further confirmation. Using contemporary lens technology and cartridge delivery systems, one can construct a cataract incision that is 2.50 to 2.75mm wide. Started at the proper location (as described later), it can have a tunnel at least 2.50mm long.

There is an area of the limbus that is approximately 0.50 to 0.75mm where there is no sub-Tenon’s space. By starting one’s incision in this area and carrying the cut anteriorly 2.00mm into the cornea, one can achieve a square geometry and avoid the potential for conjunctival ballooning during surgery.

I create a horizontal groove using a crescent blade. With the same keratome, I construct a tunnel into the cornea.
enter the anterior chamber with a blade that is 2.50 to 2.75mm in width. It is important to avoid dragging posterior conjunctiva into the incision when using the keratome. Otherwise, the outermost edge of the blade will create a small hole in the conjunctiva—the source of conjunctival ballooning.

A second advantage of starting the incision in the limbal area is that resultant fibroblastic activity seals the incision within 7 days. In contrast, clear corneal incisions take 30 to 60 days to seal with fibroblastic activity.4

In microincisional cataract surgery, incisions are 1.0 to 1.5mm wide. Placing instruments through these incisions will cause ovalization of the tissue. This distortion will destabilize the incision independent of its geometry and location. To avoid this problem, one should create a slightly larger and longer incision. Stromal hydration can help re-approximate the tissue after surgery. If leakage persists, the surgeon should close the incision with a suture.

EHUD I. ASSIA, MD

Several factors may affect the wound's stability. First, making a long corneal incision (minitunnel) is more significant than making a bi- or triplanar incision. Second, one should avoid corneal burn. The surgeon should direct the handpiece parallel to the incision. Tilting of the probe (for example, in deep-set eyes) may strangle the sleeve and decrease flow, which is required to cool the tip. One should also avoid prolonged continuous activation of ultrasonic energy—a simple precaution to take with new phaco machines that may be thus programmed.

The third issue is the incision's location. A superior incision is inconvenient, and a lateral incision tends to gap. I favor an oblique incision, which I can comfortably create and which will cause the least amount of astigmatism.

Fourth, using an anterior chamber maintainer throughout surgery maintains a steady chamber and prevents distortion of the corneal dome. A leaking incision is readily visible upon irrigation through a sideport.

Finally, the smaller the incision, the more watertight. Microincisional cataract surgery usually involves the bimanual technique (ie, an irrigating chopper or cannula in the surgeon's second hand). I prefer using an anterior chamber maintainer specifically designed for microincisional cataract surgery. I insert a new model of thinly walled, large-pored tube through a 1.2-mm inferior incision, where it provides more fluid than any available irrigating chopper. I find that irrigating instruments often flush nuclear pieces during surgical manipulations, whereas the modified anterior chamber maintainer allows me to use whichever instrument I like in my second hand. The chamber's stability does not depend on instruments inserted and withdrawn several times during surgery.

BROCK K. BAKEWELL, MD, FACS

When attempting to create a watertight wound during phaco surgery, it is important to keep three things in mind: (1) the entrance into the cornea should be parallel to the limbus and should not "fishmouth"; (2) the corneal tunnel should be at least 1.5mm in length, as originally described by I. Howard Fine, MD,5 but preferably closer to 2.0mm; and (3) the surgeon should not stretch the wound to any significant degree during phacoemulsification or the insertion of the IOL.

A watertight, uniplanar incision is best achieved by applanating or applying posterior pressure while the blade remains parallel to the iris as it advances toward the anterior chamber. The resultant entrance wound is parallel to the limbus rather than curved away from it (fishmouthing), which shortens the corneal tunnel at its sides.

It is easier to make the incision watertight by lengthening it, closer to 2.00 or 2.25mm, but elongation may cause striae during phacoemulsification that will worsen visualization. If the entrance of the incision begins in the far peripheral cornea where the conjunctival vessels are reflective, then a 2.00- or 2.25-mm incision will not cause striae.

When introducing the IOL, it is important not to stretch the wound, or corneal hydration will be required for a tight seal. While inserting the IOL, I enlarge the incision to 3mm if I am using an Unfolder (Advanced Medical Optics, Inc.; Santa Ana, CA). With an SA60 lens (Alcon Laboratories, Inc., Fort Worth, TX), I insert the Monarch injector (Alcon Laboratories, Inc.) only into the initial portion of the incision rather than entirely into the anterior chamber. I can then inject the IOL with a B cartridge without stretching a 2.8-mm incision.

These steps and an attention to detail usually produce a watertight incision and eliminate the need for corneal hydration.

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