

Improving the Seal of a Clear Corneal Incision

The stromal hydration of a supraincisional pocket helps to prevent bacterial endophthalmitis.

BY MICHAEL Y. WONG, MD

The increasing popularity of clear corneal incisions in cataract surgery has been accompanied by a worrisome suggestion that the incidence of bacterial endophthalmitis¹ and toxic anterior segment syndrome² is also on the rise. This article describes a simple, quick, inexpensive technique to tightly appose both lips of the incision and thus secure and prolong the seal.

TECHNIQUE

Prior to creating the clear corneal incision, I make a supraincisional stromal pocket 0.5 mm anterior to the intended entrance. With a simple stab of a diamond or metal keratome, I create a 2-mm pocket that resembles an equilateral triangle, its base toward the limbus. The pocket's depth can be anywhere from one-third to two-thirds stromal thickness.

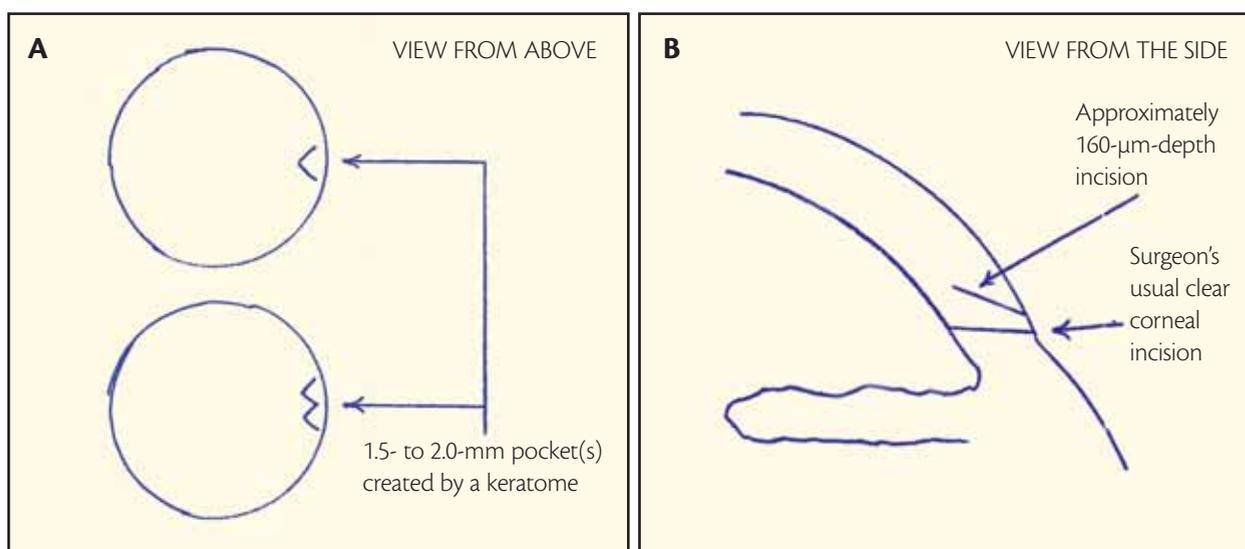


Figure 1. The surgeon begins by creating a stromal pocket that is 1.5 to 2.0 mm wide. If using two stab incisions, he places them side by side so that the incision resembles an upside down W (A). A side view shows the pocket to be just anterior to and above the usual entry into the anterior chamber (B).

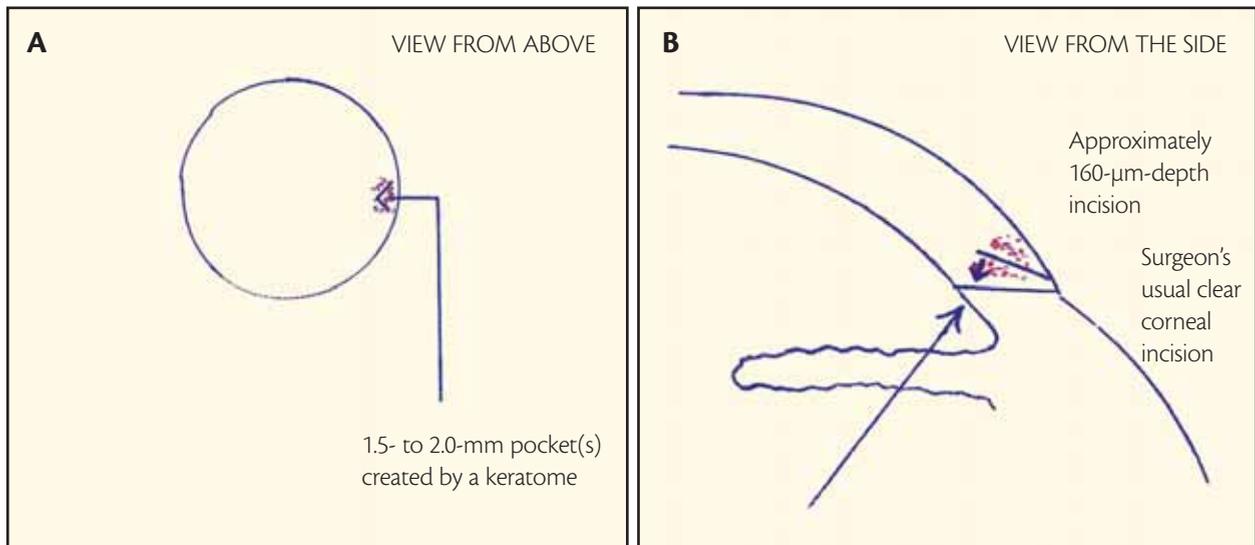


Figure 2. At the conclusion of the case, the surgeon uses a 30-gauge cannula to hydrate the tip and edges of the supraincisional stromal pocket with balanced salt solution (A). The reformed anterior chamber pushes upward on the internal aspect of the corneal lip, while the stromal hydration pushes downward on the wound (B).

I hydrate the stroma through this pocket with balanced salt solution at the end of the case, thus creating a bulge that exerts an inward pressure on the external

lip of the clear corneal incision. The internal lip is pressed outward by the IOP. The combined pressure makes for a tight apposition of both lips of the incision

and thus prevents the egress or ingress of fluid through the wound for a period of 24 hours. By that time, the ciliary body is producing aqueous, and the endothelial pump has brought the lamellae of the stroma tightly together. The seal is firm enough to withstand fluctuations in IOP, whether high or low.

One may create two pockets instead of one if desired, and I have found that there is tremendous latitude in the dimensions of the pocket(s) without impairing the effect (Figures 1 and 2). There are no significant complications of this technique. Formally described as *stromal hydration of a supraincisional pocket*, the technique is colloquially called the *Wong Way*.

INCREASED MARGIN OF SAFETY

A perfectly constructed, square or nearly square clear corneal incision created with a diamond knife is safe and secure.^{3,4} The outward forces of the IOP press up on the internal aspect of the corneal lip to provide a sufficient seal until the endothelial pump dries the internal channel of the incision. In practice, however, conditions are less than perfect. Many surgeons employ a metal knife, the incision's edges are not as clean or long as desired, its lips shrink because of heat from the phaco

tip or become stretched by the IOL's insertion, or the limbal structures are weakened by a limbal relaxing incision. The Wong Way can provide a margin of safety in these instances.

EFFECTIVE SEAL THROUGH VULNERABLE PERIOD OF HYPOTONY

The structural weakness of a standard clear corneal incision can be exposed in the postoperative period when additional biomechanical stress occurs with blinking, rubbing of the eye, ocular movement, and hypotony from a relative shutdown of the ciliary body. In vitro, hypotony in a cadaveric eye results in an inflow of India ink placed on the ocular surface.⁵ In vivo, the release of aqueous through a clear corneal incision to manage a postoperative pressure spike can result in temporary hypotony with a subsequent superficial inflow of fluorescein placed in the tear film.⁶ The resilience of the sclera causes the globe to expand from a relatively collapsed state in hypotony to produce a vacuum action. This situation may be one of the causes of toxic anterior segment syndrome.

In contrast, the Wong Way incision remains watertight in the presence of hypotony, as evident upon hy-

drating the pocket at the end of a cataract operation without reforming the anterior chamber and exerting external pressure with a cellulose sponge. The IOP is low, and the incision does not leak. In the estimated 20% of patients who experience postoperative hypotony,⁷ the eye would thus be protected from a superficial influx of fluid that might contain bacteria or other toxic substances.

MORE EFFECTIVE LOCATION OF STROMAL HYDRATION

The stromal hydration of the sides and superior roof of the clear corneal incision can create the impression that the wound is watertight while the patient is on the operating table. This fluid, however, is often resorbed during the first few hours after surgery, because it is relatively close to the endothelial pump. Further, my experience with LASIK surgery has shown that apposing stromal lamellae are more adherent when desiccated. Stromal hydration within the channel of the clear corneal incision works in opposition to this concept.

On the other hand, stromal hydration in a separate and distinct stromal pocket that is external and anterior to the clear corneal incision typically lasts for 24 to 36 hours. The inward pressure remains beyond the time period of ciliary shutdown and hypotony. Further, because this supraincisional pocket of fluid is distal to the clear corneal incision with regard to the endothelium, the stromal lamellae within the channel of the clear corneal incision are desiccated and secure before the endothelium resorbs the supraincisional fluid.

ALTERNATIVES

Concern over a possible association between clear corneal incisions and the risk of endophthalmitis¹ has prompted some surgeons to switch back to scleral tunnels. Relying on a thin layer of conjunctiva that often retracts with blinking, however, is an unreliable defense. Other surgeons suggest sealing the clear corneal incision with a fibrin adhesive, but doing so adds time, expense, and potential toxicity,⁸ and it may interfere with the desiccation of the stromal lamellae within the channel.

USES

I prefer to hydrate a supraincisional pocket with every clear corneal incision for cataract surgery. Other surgeons use the technique only when the seal of the wound is tenuous at the end of a case. I also find that the technique is useful for a paracentesis of questionable competence, when the corneal structure is less rigid than usual (eg, when the clear corneal incision is

within a limbal relaxing incision or with a young patient), and in situations when anterior chamber stability is of the utmost importance during the early postoperative period (eg, after the insertion of a Crystalens accommodating IOL [Eyeonics, Inc., Aliso Viejo, CA]).

CONCLUSION

The Wong Way aids in sealing a clear corneal incision quickly, easily, and intuitively, and it entails no additional expense. Practically speaking, this technique is complication free. The best thing I can say about the Wong Way is that the worst thing that can happen is nothing. ■

To obtain a video of Dr. Wong's technique, readers may contact him via e-mail.

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