# OPTIMIZING THE INCISION

Proper construction is critical to success.

BY LISA BROTHERS ARBISSER, MD

In refractive cataract surgery, mastering each technique's intricacies is essential for optimizing patient outcomes. This column is designed to be a comprehensive guide for both novice and seasoned ophthalmologists that focuses on pivotal aspects of surgery. Drawing from my chapter on surgical pearls that appeared in the book *The Art of Refractive Cataract Surgery for Residents, Fellows, and Beginners*,[1] coedited by Fuxiang Zhang, MD, and Alan Sugar, MD, articles offer a detailed examination of surgical steps and are complemented by video demonstrations when available.

Each installment explores a different facet of surgery for the refinement of technique and patient care. The goals of this approach are to enhance surgical skills and promote a deeper understanding of the nuances involved in managing diverse cases.

1. Zhang Y. *The Art of Refractive Cataract Surgery*. 1st ed. Thieme Publishers; 2022. 

Every step of the cataract procedure affects the quality of what follows. A properly constructed incision helps avoid a possible cascade of complications ranging from iris prolapse to endophthalmitis.

## PARACENTESIS

### Paracentesis Incision Size

Historically, the standard paracentesis incision has measured approximately 1 mm. I preferred a slightly smaller, trapezoidal incision—approximately 0.5 mm internally and modestly wider externally—created using a diamond blade (Figure). This configuration minimizes fluid egress during instrument exchange. Alternatively, a silicone-sleeved chopper may be used to reduce wound leakage and prevent fluid surge around the instrument shaft. On average, my cases required only 50 to 75 mL of balanced salt solution (BSS; Alcon) in total, due in part to the decreased leakage at the paracentesis site.

### Fluid Dynamics and Chamber Stability

BSS leakage can reach up to 22 mL/min through a 1-mm paracentesis when the internal valve is compromised—for example, by the insertion of a chopper. This disruption of the closed chamber environment can jeopardize corneal endothelial integrity and promote the migration of nuclear fragments toward the paracentesis during phacoemulsification. Although advances in fluidics—such as the Active Fluidics technology on the Centurion Vision System (Alcon)—may partially compensate for this instability, reducing wound leakage at its source remains essential for chamber stability and surgical efficiency.

### The IOP

Although inherent scleral rigidity varies between individuals, the most controllable factors are IOP and the maintenance of tissue planes. Establishing a stable IOP is critical. I recommend instilling OVD immediately after paracentesis creation and intracameral lidocaine administration, but before constructing the clear corneal incision (CCI).

Overpressurizing the eye at this stage may result in a corneal tunnel that is too short, whereas underpressurization can lead to an excessively long or irregular tunnel. Mastery of this step promotes consistency in incision creation, yielding a more precisely shaped and secure wound—key to chamber stability, reduced leakage, and optimized surgical outcomes.

### Paracentesis Placement

I placed my paracentesis 90° away from the main CCI. Although the effect might have been minimal, this approach canceled out surgically induced astigmatism instead of creating an unpredictable vector between the two. Since I retired from practice, we surgeons have come to understand that the use of the centroid for toric calculations is superior to the surgically induced astigmatism value. I remain convinced, however, of the continuing value of the paracentesis placement I employed. This configuration also provides an excellent angle for applying mechanical forces and separating nuclear fragments.

## CCI CONSTRUCTION

The CCI should be snug but not tight so that silicone-sleeved instruments

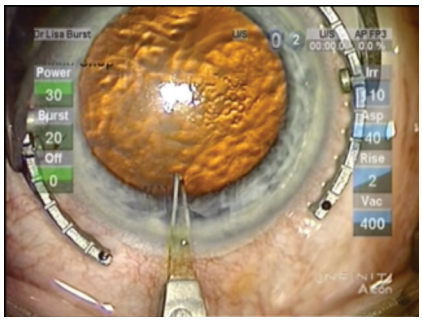


Figure. A diamond trapezoidal blade for incision creation.

may be inserted with minimal leakage. An oversized, leaking incision can result in increased fluid turbulence, an unstable environment, and an excessive amount of BSS flowing through the anterior chamber. Conversely, an undersized incision restricts irrigation inflow, increasing the risk of postocclusion surge and wound burn. A stretched incision that is too small may compromise the integrity of the internal Descemet valve, necessitating additional hydration for closure and creating a less secure barrier to inflow during the early postoperative period—a potential risk for endophthalmitis.

## SURGICAL PEARLS

### Wound Integrity

The stroma is elastic, whereas Descemet membrane is not. This distinction explains why stretched wounds become incompetent, requiring significant stromal hydration and elevated IOP to appear closed. Because the IOP quickly normalizes and stromal hydration resolves within a few hours, stretched incisions may suck or leak, potentially resulting in endophthalmitis

### Incision Shape and Placement

The goal is to construct a square incision. This shape has been demonstrated to provide the greatest structural integrity.[1] Premature entry of the blade may result in a tunnel that is too short to resist deformation, potentially precipitating iris prolapse. Conversely, an overly long tunnel can create unfavorable instrument angles, with oar-locking leading to visually obstructive striae. Encroachment on the visual axis must also be avoided because it may induce subtle but persistent irregular astigmatism.

### Instrumentation

My preferred scalpel is a diamond trapezoidal blade (Arbisser-Fine Triamond Blade, Mastel Surgical; no financial interest). With this thin, precision instrument, incisions ranging from 0.3 mm to any required size may be created, as determined by a dedicated marker (Figure; scan the QR code to watch a video). I. Howard Fine, MD, emphasized the importance of maintaining a single intrastromal plane that mirrors the curvature of the cornea and then dips slightly to enter Descemet membrane in a straight line parallel to the iris, regardless of the blade chosen.[2]

### Wound Closure

I took a slightly different approach to wound closure by not relying primarily on lateral stromal hydration. Instead, I began by irrigating the tunnel to remove debris from between the lips of the internal Descemet membrane valve and tunnel. I then performed stromal hydration of the roof of the incision, ensuring that the floor and ceiling met to achieve effective wound closure. Although modest lateral hydration may be required in some situations, the keys are to free the tunnel of OVD and lens fragments and to bring a thickened incisional roof together with the incisional floor. Solid closure of a properly constructed, unstretched CCI can be confirmed by the presence of a dry gutter at normal IOP.

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This method also helps to reveal errant or hidden lens fragments (scan the QR code to watch a video). The IOP is adjusted to a normal level via the paracentesis, which should be treated in a similar manner to the main CCI. A tonometer may be used, although with experience, touch assessment becomes sufficient. A dry gutter can be confirmed with a cellulose sponge, although a fluorescein strip may also be used for verification. Once the incision has been closed, only pinpoint pressure on the posterior lip will threaten its integrity. Even if the eye becomes hypotensive, the incision will not suck (scan the QR code to watch a video).

If, for any reason, the incision does not close, a suture or surgical adhesive may be placed. ■

1. Masket S, Belani S. Proper wound construction to prevent short-term ocular hypotony after clear corneal incision cataract surgery. *J Cataract Refract Surg*. 2007;33(3):383-386.
2. Fine IH, Hoffman RS, Packer M. Profile of clear corneal cataract incisions demonstrated by ocular coherence tomography. *J Cataract Refract Surg*. 2007;33(1):94-97.

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