

The Cataract Incision

Surgeons share their advice on its creation, architecture, and management.

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Although discussed less frequently at meetings than phaco techniques and technology, the cataract incision is integral to a successful procedure. *Cataract & Refractive Surgery Today* asked several surgeons for their tips.

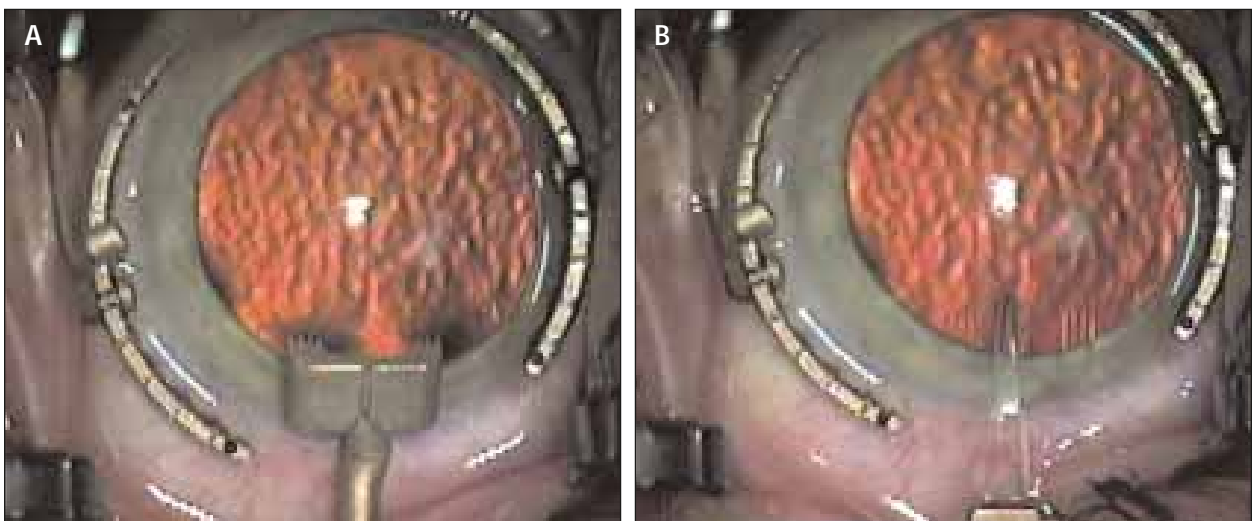
LISA BROTHERS ARBISSER, MD

I use a diamond scalpel for cataract surgery incisions. I prefer a trapezoidal blade, specifically the Fine Stealth Triamond blade (Mastel Precision, Inc., Rapid City, SD), which I can use freehand to create an incision of any size, from 0.3mm up. A marker that scores the epithelium facilitates the creation of accurately sized incisions to within 0.1mm (Figure 1).

I make my surgical incision in the same location, except in special circumstances such as zonulolysis. I sit beside the patient so that visualization is optimal and my angle of attack is the same regardless of the patient's

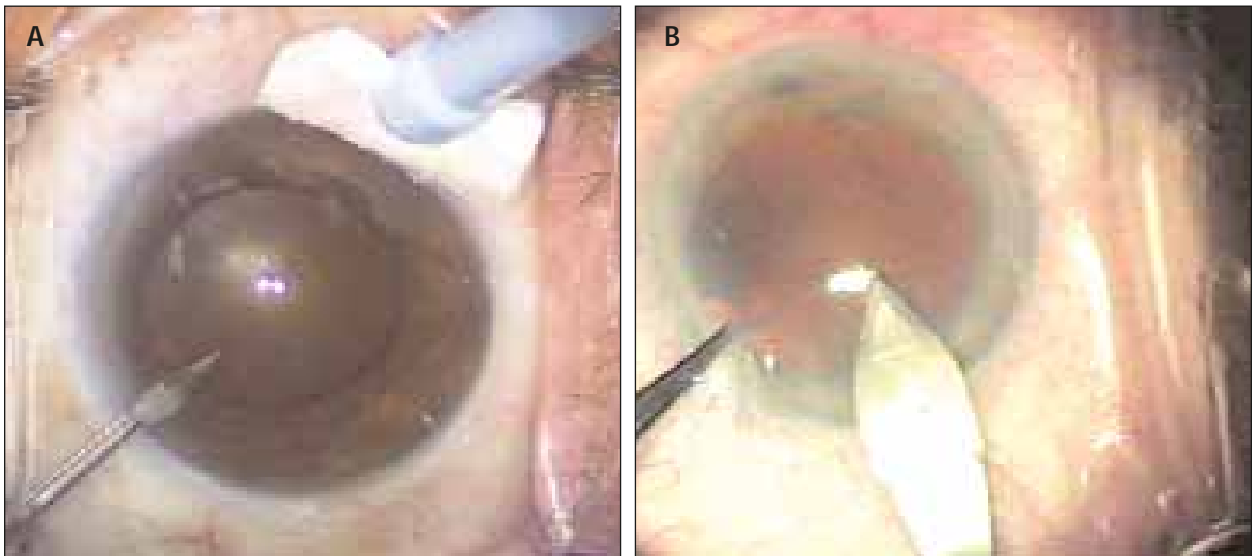
brow configuration. The angle of attack must be greater than 17° as Jack Singer, MD, taught us.¹ I perform the paracentesis 90° away from my main incision and strive to make the paracentesis 0.5mm wide and at least 0.75 to 1.0mm long in order to avoid a leaky chamber. I prefer the single-plane incision as originally described by Dr. Fine.²

I only make a groove when combining the cataract incision with a limbal relaxing incision for greater than 2.00D of against-the-rule astigmatism. I expect approximately 0.25D of with-the-rule astigmatism to result from my temporal incision and take this into account when planning the need for a simultaneous, peripheral astigmatic keratotomy. I aim for a true clear corneal entry, just inside the vessels, and prefer a 1.75- to 2-mm long tunnel. The incision should remain under 3mm wide if it is to be sutureless. Consistent pressurization of the anterior chamber is important when creating the



(Courtesy of Lisa Brothers Arbisser, MD)

Figure 1. A marker (Mastel Precision, Inc.) scores the epithelium and allows the surgeon to precisely quantify the incision's width (A). The Fine Stealth Triamond blade travels laterally to a scored epithelial line to make a 2.8-mm incision (B).



(Courtesy of Donald N. Serafino, MD)

Figure 3. Dr. Serafino creates a 1-mm, angled sideport incision (A). For the cataract incision, he prefers a stainless steel blade (B).

perform minimal stromal hydration to establish secure closure. After irrigating the main incision, I control IOP through the paracentesis by first overfilling the anterior chamber to ensure that the incision is secure and then burping the paracentesis until the pressure is at a physiologic range by palpation. I then use a Weck-cel sponge (Medtronic Xomed Ophthalmics, Inc., Minneapolis, MN) to see a dry gutter at the main incision at a normal pressure. Usually the hardest incision to seal securely is the paracentesis, which will sometimes ooze slightly when the pressure is high. I perform stromal hydration of the paracentesis as well.

I have a low threshold for adding a suture. If an incision does not seal on the first try, I will allow 1 to 2 minutes for any “fish-mouthing” of the internal incision to resolve if the incision is anatomically correct. Sometimes, raising the lid speculum from the globe will resolve this change in configuration and result in a secure seal with the next attempt at hydrating or irrigating the sides of the incision. I place a suture if I see that Descemet’s is out of place, I observe that the anatomy of the incision is sub-optimal, or fish-mouthing continues for more than 2 minutes after the resolution of any pressure on the globe. I prefer a 10-0 Biosorb suture (Alcon Laboratories, Inc., Fort Worth, TX), which, although wiry like Prolene (Ethicon Inc., Somerville, NJ), is absorbable over a period of 1 to 2 months. A single radial suture is generally optimal. I never leave a pediatric cataract incision greater than 1mm unsutured. I will also place a suture in the presence of a vigorous filtering bleb for fear that the IOP may be low enough to compromise the internal valve closure during the early postoperative period.

ROBERT M. KERSHNER, MD, MS, FACS

To achieve a completely astigmatically neutral, self-sealing cataract incision, the surgeon should place the incision on the clear cornea, anterior to the vascular arcades, either in the temporal region (where the pulling and gaping effect of the rectus muscles is the least) or in the oblique, temporal location farthest from the optical center of the eye.⁴ The incision should be constructed in a plane parallel to the iris. Surgeons who routinely work on the cornea know that incisions there are unforgiving: they need to be sized appropriately, or they will be stretched or torn, inducing unwanted astigmatism and poor healing.

The ideal incision follows the arc of the cornea and is rectangular, with a width-to-length ratio of approximately 3:2. Surgeons should correct astigmatism greater than 0.50D with a two-plane, vertical incision of 90% depth followed by parallel entry in the horizontal plane.^{5,6} I always place a clear corneal incision on the steep meridian to induce a predictable, controlled amount of flattening^{7,8} (Figure 2). If more than 1.50D of astigmatism is present, an additional arcuate vertical incision on the opposite meridian will help correct it.

Although diamonds are a surgeon’s best friend, they are expensive and fragile, and these blades require careful handling. Using semiconductor technology from the computer age, the affordable, disposable BD Atomic Edge Blade (BD Ophthalmic Systems, Franklin Lakes, NJ) creates a diamond-like incision. I mark the incision with the Arcuate A/K Marker from Rhein Medical Inc. (Tampa, FL). For a clever way to automatically construct arcuate incisions, I recommend the Terry/Schanzlin Astigmatome

(OASIS Medical, Inc., Glendora, CA). Nomograms may be downloaded from <http://www.bd.com/ophthalmology>, <http://www.oasismedical.com>, and <http://www.eyelasercenter.com/physicianresource.htm>.

BRETT W. KATZEN, MD

Initially, I was most impressed when I was shown several electron-microscopic views of metal blades and the black diamond knives from Accutome, Inc. (Malvern, PA). It was obvious that, after several applications, the diamond blades remained sharp, without wearing of the edges, whereas the metal blades showed early signs of wear and change. These diamond blades allow me to create a precise, self-sealing corneal incision case after case. After many thousands of surgeries, I am also convinced that autoclaving does not affect the sharpness of these knives. My ASC administrator and I have reviewed our data to assess the cost effectiveness of the Accutome black diamond knives we are using as compared with disposable blades, and we are convinced that the diamond blades are the best choice.

My primary reason for committing to these knives is the reproducibility of the incisions I create. Whether the eye is firm, is deep-set, or has undergone previous surgery, the incision is perfect in each and every case. Glare and incisional hydration are not factors. These blades create an accurate linear incision, which allows me to focus on the surgery and not my instrumentation.

DONALD N. SERAFANO, MD

I make two incisions whether performing standard coaxial phacoemulsification or using the Aqualase Liquefaction Device (Alcon Laboratories, Inc.). The cataract incision is temporal and located at the limbus, and it does not involve the conjunctiva. I place the sideport incision approximately 90° from the cataract incision at the limbus, also without involving the conjunctiva. My sideport incision is tapered such that it is 1mm wide at the epithelium (Figure 3A) but 0.8mm long at the endothelium. My cataract incision is 3.2mm if I am using the Aqualase Liquefaction Device. For ultrasound, I use a 2.2-mm incision when employing a 0.9-mm flared microtip with an ultraflow sleeve. With a standard 1.1-mm phaco tip and a high-infusion sleeve, the incision is 3.2mm.

I create the cataract incision with a stainless steel, clear-cut, high-performance, dual-beveled, angled keratome (Figure 3B). For the sideport incision, I rely on a 1-mm, angled, sideport blade. For all cataract incisions, I plan a corneal intrastromal tunnel of between 1 and 2mm in length. I strive to avoid a short entry that is perpendicular to the epithelium. Instead, the entry

should be at an acute angle.

The incision can tear, stretch, or burn if the surgeon exerts enough pressure against and/or sufficiently manipulates the tissue. For that reason, I keep instrumentation at the center of the incision to allow the proper inflow of irrigation and permit adequate incisional outflow. I test all incisions for leakage by raising IOP to a normal tension and pressing on the globe in a dry field. If in doubt, I place a single 10–0 radial suture.

I. HOWARD FINE, MD

Constructing the incision is only one factor in successful clear corneal cataract surgery. For example, I favor fourth-generation fluoroquinolones as pre-, intra-, and postoperative antibiotics. Additionally, it is important to prepare the surgical field, for which I use 5% povidone-iodine (Betadine; The Purdue Frederick Company, Stamford, CT) as a scrub. I evert the lashes with steristrips, drape over the meibomian orifices, and put a wick in the lateral canthus angle to allow for continuous drainage. I always operate at the temporal corneal periphery and use limbal relaxing incisions rather than incisions in the steep axis to address astigmatism. The corneal periphery, temporally, allows for the neutralization of the forces of gravity and blinking eyelids.

I fill the anterior chamber through a sideport incision with viscoelastic while expressing aqueous in order to create a stable, firm eye that will not become unpredictably distorted as I make the incision. The architecture of the cataract incision is a single plane, in the plane of the cornea. I can include the corneal vascular arcade as long as I am anterior to the conjunctiva. I direct the knife in the plane of the cornea for 2mm and then enter Descemet's. The incision's width is no larger than 3.5mm. I like trapezoidal knives, which allow me to enlarge the incision without sacrificing architecture as side-cutting knives do. I strongly prefer the 3-D Blade (Rhein Medical Inc.).

Surgical technique is an important part of the process. I never grasp the superior lip of the incision with a forceps, because abrading the epithelium will eliminate the fluid barrier that allows for vacuum sealing as a result of endothelial pumping. I use power modulations to minimize thermal injury to the incision. Additionally, I feel that IOL implantation should not involve aggressive stretching of the incision, the eye should be stabilized with a fixation ring, and injectors are far superior to forceps for IOL insertion. Finally, I always ensure the incision's closure with stromal hydration and perform fluorescein testing to be certain there is no leakage. ■

Safety, efficacy and economy. Proof points make a compelling case for Hansatome microkeratomes

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Elizabeth A. Davis, MD, FACS

My practice has used the Hansatome™ microkeratome for approximately ten years, with excellent results. We have found the quality of flaps to be extremely high and reproducible (our incidence of flap complications is one percent). Personally, I cannot remember the last time I saw a significant epithelial defect with the Hansatome microkeratome. Other flap complications, such as short flaps, free caps and buttonholes, are extremely rare – probably occurring in less than one in 1,000 cases in an experienced surgeon's hands.

Flap creation is fast – requiring less than twenty seconds of suction time. It can be done beneath the laser microscope; laser ablation with the excimer can immediately follow. If a patient experiences any discomfort, it is brief. In an efficiently run laser center, a surgeon can perform three to four procedures per hour.

Postoperatively, Hansatome microkeratome flaps appear very quiet, and there is little if any edema the day after surgery. Consequently, visual recovery is very rapid and, in most cases, flap edges are virtually imperceptible.

The Hansatome microkeratome unit itself is very portable – a useful feature for practices with more than one office. On the other hand, because the Hansatome microkeratome is so affordable, some practices (including my own) have a device in each location. Four of our surgeons are operating at any given time. If one location experiences problems with the microkeratome, a device can be quickly transported from another office – without having to cancel surgeries. This is a rare occurrence, but reassuring nonetheless.

Overall, we have been extremely pleased with the performance and results of the Hansatome microkeratome. Given that it is the most widely used microkeratome in the United States, this experience is clearly not limited to our practice.