



# Putting Safety First

Learn about the Pop and Prechop technique and other helpful strategies for beginning cataract surgeons.

Handle the conjunctiva with care ... don't press so hard with the other hand ... regrasp the capsulorhexis flap close to the tear point ... ease up on the phaco power ... pay attention to the posterior capsule ...

As the director of a residency program, I know your mental checklist for performing cataract surgery is long, and learning each maneuver is difficult. So, like my counterparts at teaching programs across the country, I'm continually evaluating our teaching techniques and trying to create new ways to improve them.

One of the changes we've made at Weill Cornell Medical College is having residents use a modified supracapsular-cataract-removal technique that I developed. I call it the "Pop and Prechop." The technique, a modification of existing

supracapsular approaches, such as "Phaco Tilt"<sup>1</sup> and "Pop and Chop,"<sup>2</sup> has facilitated the learning process and enhanced safety and outcomes. Here I describe Pop and Prechop while highlighting other strategies that beginning surgeons may find useful.

## Taking the First Steps

Before surgeons operate on human eyes, adequate practice time in the wet lab is essential. At Cornell, we require residents to perform a minimum of 20 supervised phaco procedures in the wet lab before moving on to the operating room.

In addition, residents and attending physicians spend a great deal of time watching videos of established surgeons performing surgery, and discussing what they're thinking

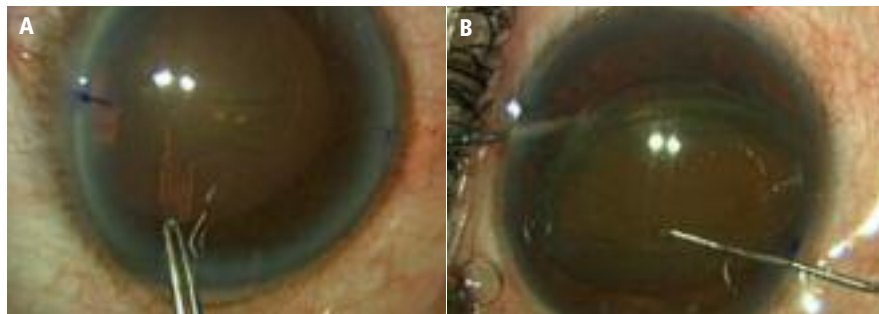
and doing at each step in the procedure.

Virtual reality surgical simulators such as the EYESi Ophthalmosurgical Simulator (VRmagic, Mannheim, Germany) are useful but prohibitively expensive for many programs.

Proper tissue handling and countertraction are skills that must be mastered early so incisions, starting with the paracentesis, can be safely created. Surgeons have to work with the nondominant hand so they're not damaging the conjunctiva or applying too much pressure while fixating the globe. Positive pressure with the nondominant hand can lead to a cut iris or capsule or stripping of endothelial cells when the blade contacts the cornea.

## Working With Anesthesia

While many beginning surgeons prefer to use retrobulbar or peribulbar anesthesia for cataract surgery because the eye is immobilized, I recommend topical anesthesia with intracameral lidocaine. In my experience, even though beginning surgeons' procedures tend to take longer, this approach provides adequate



For the Pop and Prechop technique, the surgeon creates two paracenteses, 180 degrees apart, and a 5.5-mm to 6-mm capsulorhexis (left). A "popped" lens about to be chopped.

anesthesia without injection-related risks, such as globe penetration or retrobulbar hemorrhage. In cases involving poor dilation, pseudoexfoliation or intraoperative floppy iris syndrome, epinephrine can be added to enhance mydriasis. It's important when injecting intracameral lidocaine and epinephrine to deliver the injection directly onto the iris stroma.

### Using OVDs

Once the anesthesia is in place, an ophthalmic viscosurgical device (OVD) can be introduced into the anterior chamber. I recommend Healon 5 (Advanced Medical Optics, Santa Ana, Calif.) for surgeons just starting out. Healon 5 provides adequate protection for the corneal endothelium and provides a slow, controlled environment for subsequent surgical steps. It flattens the anterior lens capsule to support a successful capsulorhexis. Even when it looks as if the capsule is tearing too far radially, Healon 5 allows sufficient time to react.

For extra endothelial protection, the surgeon can use a soft-shell technique, injecting a dispersive OVD, such as Healon D (Advanced Medical Optics), first. Healon 5 is then injected beneath the dispersive, which creates an effective endothelial cushion during the entire procedure. This is ideal for beginning surgeons, who tend to use excessive phaco energy and are still getting comfortable manipulating instruments. It's also useful for endothelial protection during supracapsular phacoemulsification.

### Keys to the Pop and Prechop

For the Pop and Prechop technique, the surgeon creates two paracenteses 180° apart. For example, if the surgeon is operating temporally, one incision is made at 6 o'clock and the other is made at 12 o'clock. (The clear corneal incision is made at 9 o'clock in the left eye and 3 o'clock in the right eye.)

Once the anterior chamber is filled with OVD, the capsulorhexis is created. The ideal capsulorhexis is between 5.5 mm and 6 mm in diameter. Beginning surgeons are sometimes tentative and create a smaller capsulorhexis, which is undesirable for several reasons. It increases the risk of clipping the anterior capsule with the phaco probe and pulling it in. Postoperatively, a small capsulorhexis increases the chances of anterior phimosis and zonular stress and possibly posterior capsular opacification. A small rhexis may also prevent prolapse of the nucleus in supracapsular surgery. A capsulorhexis that is too large presents problems too, including an increased risk of IOL decentration or dislocation.

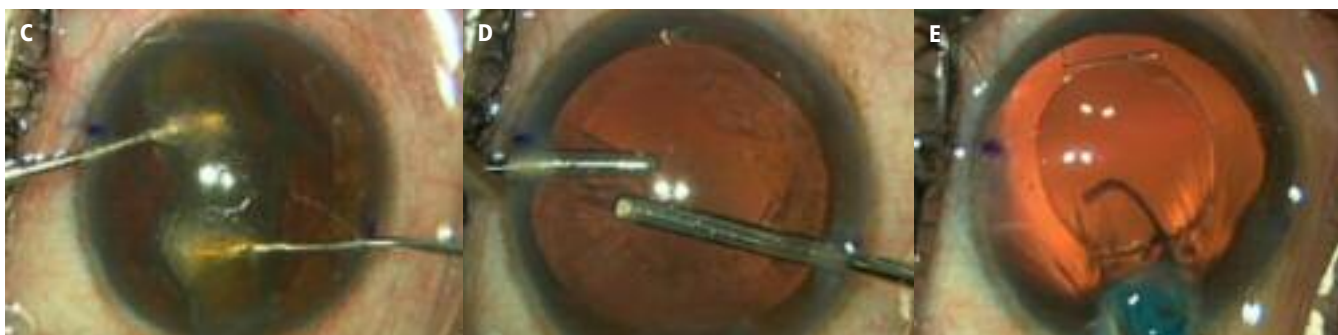
Some surgeons advocate a much larger capsulorhexis for

supracapsular techniques, but I have found 5.5 mm to 6 mm to be ideal for Pop and Prechop with implantation of a 6 mm-optic IOL. At this size, the nucleus can be successfully prolapsed, or "popped," out of the bag in nearly all cases.

After the capsulorhexis is created, but before hydrodissection, the majority of Healon 5 should be exchanged with a balanced salt solution (BSS) to free up space in the anterior chamber. This serves to normalize the pressure in the anterior chamber and allow the lens to be prolapsed out of the bag during hydrodissection, which cannot occur if the eye is filled with OVD.

Next, the surgeon places the hydrodissection cannula tangential to the lens almost out to the equator and tilts the capsule upward. While delivering BSS into one paracentesis, the surgeon presses down on the lens equator so the fluid wave pops the lens out of the bag toward the other paracentesis. With the lens partially out of the bag, the surgeon has access to the retronuclear space and can use the other paracentesis to inject a dispersive OVD behind the pro-

Healon 5, which is an ophthalmic viscosurgical device (OVD), has many desirable properties and uses as an adjunctive surgical tool. However, it's important to note that Healon 5 requires certification before use. Residents should work with their attending physicians to become Healon 5 certified before leaving their programs. Certification is mandatory because of the unique properties of Healon 5. If a resident were to leave an excess amount of Healon 5 in the eye, an elevated IOP could occur. For more information on Healon 5 — and for information on becoming certified to use it — [healon.com](http://healon.com).



With Pop and Prechop, the nucleus is prechopped (left) without the use of phaco energy. When nuclear removal is complete, the surgeon can use the two paracenteses to bimanually remove cortex (center). The surgeon then simply switches hands to remove the subincisional material. To ensure the IOL is delivered smoothly into the capsular bag, beginning surgeons can insert the cartridge all the way through the incision (right).

lapsed nucleus. This posterior cushion of OVD protects the posterior capsule by keeping it away from the phaco tip.

Once the dispersive OVD is in place, the same paracentesis can be used for introducing any instrument into the space behind the lens to aid in prechopping. I recommend a cyclodialysis spatula, which increases safety for the beginning surgeon because of its broad and blunted tip. The surgeon then introduces a Sinsky hook (Berson & Associates, Morgan Hill, Calif.) or similar instrument through the other paracentesis, placing it above the lens. Instruments are now behind and in front of the lens. The surgeon brings them together in a scissoring motion to chop the lens in half. The maneuver can be repeated to break the two hemispheres into smaller pieces.

With prechopping accomplished, the surgeon is left with small, easily emulsified lens fragments in the anterior portion of the eye. After instillation of a small amount of dispersive OVD, the phaco tip is introduced into the eye. Beginning surgeons should use rounded or spatulated second instruments during phaco

in case the nondominant hand wanders toward the posterior capsule.

When nuclear removal is complete, the surgeon can use the two paracenteses to bimanually remove cortex. One of the most difficult aspects of cortical removal is removing subincisional cortex. When a traditional coaxial approach is used, it is practically a blind maneuver that can lead to a broken capsular bag and zonular dehiscence. However, with the bimanual approach, irrigation in one hand and aspiration in the other, the surgeon simply switches hands to remove the subincisional material.

### Advantages of Pop, Prechop

The Pop and Prechop technique is ideal for beginning surgeons because it enhances safety at points in the procedure where they tend to need it most.

First, the more phaco energy that is utilized, the higher the chance of corneal damage and endothelial cell loss. With Pop and Prechop, the lens is prechopped without the use of any phaco energy at all, and the case can be completed with much

lower phaco settings.

Second, it's not uncommon for beginning surgeons to push the lens back into the capsular bag when they enter the eye with the phaco tip, necessitating a more difficult intracapsular technique. With Pop and Prechop, the lens is broken up without phaco energy. The phaco tip comes into play much later and the lens fragments are kept in the anterior portion of the eye. In challenging cases of floppy iris or miotic pupils, the prolapsed lens can act as an iris retractor allowing easy access above the iris for phaco.

Third, bimanual irrigation and aspiration simplifies cortex removal, subincisional cortex in particular. Furthermore, it helps beginning surgeons to become comfortable with bimanual surgery, which is the future of cataract removal.

### Using the Right Tools

When it comes to safety and confidence-building for beginning surgeons, the choice of tools can be just as important as the choice of technique. Today's phaco technologies and IOLs are an asset in this regard.

For example, the burst and pulse modes now available in phacoemulsification systems minimize the amount of energy delivered to the eye. And innovations such as transversal ultrasound increase cutting efficiency and enhance followability. These types of technological advances translate into improved safety and effectiveness, and therefore better outcomes.


One-piece IOLs are a wise choice for beginning surgeons, too. The Tecnis 1-Piece IOL (Advanced Medical Optics), for example, has reduced center thickness, which eases implantation. Its acrylic material is less sticky than that of other lenses, so it is somewhat easier to handle and load into the delivery cartridge. Proper loading cuts down on the need to manipulate the

IOL inside the eye. In addition, the haptics unfold gently.

I recommend that beginning surgeons implanting IOLs insert the cartridge all the way through the incision into the eye to ensure the lens is delivered into the bag. Sometimes this requires extending the corneal wound slightly, but it's an extra step that will add peace of mind. While veteran surgeons are able to push the cartridge right up to the wound and inject the IOL fairly easily, beginning surgeons struggle with applying consistent pressure, which can result in partial implantation, the trailing haptic coming out of the bag and potential damage to Descemet's membrane.

### More Safety, Less Stress

Teaching and learning

cataract surgery are highly rewarding but also highly stressful. By reducing complications and improving patient outcomes, the tips and techniques presented in this article will help you to increase your rewards and relieve your stress. 

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cohorts remained unchanged after enrolling in HORIZON.


"We can't say for sure why the patients in the group that was treated initially lost some of the gain in visual acuity," Dr. Sadda noted. "It may be the result of less regular administration of ranibizumab, since these patients were treated on an as-needed basis. It may be due to the fact that some vision loss is inevitable as the disease progresses, even in the face of treatment. Or it may be a combination of these and other factors. The study wasn't designed to answer this question.

"What we can say from these findings is that if you have neovascular AMD, by the end of 2 years, most of what's going to happen to your eye will have happened, and it's unlikely that vision will improve. However, if you've been treated early, additional treatment

may preserve some of the vision you've gained or slow down further vision loss."

### Chronic Disease Requires Long-term Solution

As Dr. Sadda points out, HORIZON adds to our knowledge about therapy for wet AMD because it's the only study that gives data into the third year of treatment. And he has been struck by the fact that some patients, even those who've already had 2 years of therapy, still require additional treatment with ranibizumab.

"HORIZON underscores that we're dealing with a chronic disease, not one that can necessarily be treated for a short period of time and you're done," Dr. Sadda said. "This is very valuable insight that has already changed the way I counsel patients." 

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