

Nucleofractis. No Laser? No Problem!

A prechop technique can reduce effective phaco time and energy in the eye, contributing to better outcomes and more efficient surgery.

BY CHARLES S. AHN, MD

Prephaco chopping or prechop, as it was first described about 20 years ago by Takayuki Akahosi, MD, is a technique for fracturing the nucleus under viscoelastic material prior to phacoemulsification. As other advocates of prechopping have noted, it allows one to use less phaco energy during the procedure.

Recently, surgeons have become more attuned to the concept of phaco energy with the discussion of the femtosecond laser's capabilities in cataract surgery. A key advantage of both prechop and laser phacoemulsification is the ability to partially prepare the lens (either by mechanical prechopping or by laser fragmentation) for extraction before employing ultrasound energy. In a way, prechop can be considered the "poor man's femtosecond laser."

With either prechop or femto-phaco, it would be expected that reducing the effective phaco time and total phaco energy in the eye would decrease trauma to the iris and corneal endothelium, thus reducing inflammation and edema and improving visual results, especially during the early postoperative period.

A two-handed technique with a nucleus sustainer is advisable for dense (4+) nuclei, and prechopping may not be necessary for soft nuclei that can be aspirated with little phaco energy. Prechopping also is not ideal in eyes with zonular dehiscence, because the mechanical chopping places additional stress on the already weakened zonules. For the majority of the grade 2 to 3 cataracts on which I operate, however, prechop is my preferred technique.

PRECHOP TECHNIQUE

I typically create a 2.4-mm entry wound and perform the capsulorhexis, hydrodissection, and hydrodelineation. It is important

that hydrodissection be sufficient to allow the nucleus to rotate freely in the capsular bag. Next, I insert an Inamura prechopper (ASICO, LLC) and use it to bisect the lens along the lens fibers. I rotate the lens 90° and divide it again into quadrants. Other surgeons may choose to divide the lens into six wedges before phacoemulsification and/or to utilize any of a number of other chopping instruments.

Prechopping is performed in the capsular bag, well away from the endothelium, but a dispersive viscoelastic is critical to protect the endothelium from the mobile fragments later, as the surgeon moves into the phaco portion of the procedure. I find the prechop technique to be particularly effective in eyes with small pupils or intraoperative floppy iris syndrome (with good zonular support), because it allows me to stay in the center of the nucleus and divide it with minimal iris manipulation.

Once the pieces have been chopped, it is easy to engage each segment with the phaco tip and pull it toward the center of the eye with minimal energy. I use the WhiteStar Signature system (Abbott Medical Optics Inc.) with a 30° Kelman bent-tip phaco needle. Although the venturi pump can be used at this point, I prefer the peristaltic mode run at a very high maximum vacuum of 550 mm Hg with an aspiration rate of 40 mL/min.

The aforementioned system is versatile, because I may choose either peristaltic or venturi-style pumps or alternate between the two. When I employ the very high vacuum setting that I prefer, the peristaltic fluidics decrease turbulence throughout the procedure and automatically step down the vacuum if needed to prevent postocclusion surge. This provides me with the confidence to operate efficiently at high vacuum while maintaining a very stable anterior chamber.

The use of transversal ultrasound with the Ellips



FX handpiece (Abbott Medical Optics Inc.) adds to my efficiency with this technique. It allows me to use simultaneous longitudinal and nonlongitudinal phacoemulsification, while reducing chatter and improving followability. This capability would be an asset with any technique, but for me, it means that the prechopped nuclear segments can be emulsified very quickly, further contributing to my goal of reduced energy and trauma to the eye.

TECHNICAL PEARLS

The most challenging part of learning prechop is developing a feel for how deeply to impale the lens with the chopper. Many surgeons find it difficult to judge the depth of the chopper in the nucleus, and they are afraid of going too deep and potentially hitting or even puncturing the posterior capsule. In my experience, the most common mistake is to open up the blades too soon, preventing a good division of the nucleus because the chopper is not deep enough. I allow the blades to “sink” into the nucleus before slowly opening them.

I also recommend that surgeons not be overly committed to prechopping. If for any reason the lens nucleus does not prechop easily, they should be quick to abandon the initial plan and simply convert to phaco chop. The goal of prechop is to reduce the amount of energy and trauma. If the surgeon does not obtain a suitable division at the start and then continues to exert too much pressure, all that manipulation can place stress on the zonules and completely negate the benefits of prechop.

In the future, it may be shown that femtosecond laser-assisted phacoemulsification eliminates the need for prechop. For those who do not (yet) have a femtosecond laser with lenticular applications, however, prechop is an excellent technique for improving efficiency and visual acuity outcomes after cataract surgery. ■

Charles S. Ahn, MD, is in practice with the Dupage Eye Specialists in Downers Grove, Illinois, and is a clinical instructor at the University of Illinois at Chicago Department of Ophthalmology. He is a consultant to Abbott Medical Optics Inc. Dr. Ahn may be reached at (630) 322-8300; charles.ahn@dupagemd.com.



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to letters@bmctoday.com.