The PhacoFirst Technique

The femtosceond laser is making new surgical techiques possible.

BY STEPHEN G. SLADE, MD

Femtosecond lasers will enable ophthalmologists to use surgical techniques that were impossible with conventional cataract surgery. I, for example, recently began using what I call the *phacofirst technique* in which the first surgical instrument in the eye is the phaco handpiece (Figure 1). This technique uses no capsulotomy forceps or needle, no hydrodissection, and no prechopping or rotating of the nucleus. I simply perform an intracameral injection of Shugarcaine (4% unpreserved lidocaine diluted 1:3 with BSS Plus [Alcon Laboratories, Inc.], which produces a 1% lidocaine solution with a pH of 6.97). Then, I completely fill the anterior chamber with viscoelastic. Using the phacofragmentation tip, I open the main incision, check the capsulorhexis, core the center of the nucleus, and remove the segments.

The steps of the phacofirst technique, in order, are

- perform an intracameral injection of Shugarcaine
- inject a dispersive viscoelastic such as Viscoat (Alcon Laboratories, Inc.) to completely fill the anterior chamber and coat the endothelium
- enter the anterior chamber though the primary incision using the sharp edge of the phaco tip
- verify and/or complete the capsulorhexis with the phaco tip (Figure 2)
- core out the central cylinder of a cylindrical/chopping pattern
- remove the nuclear segments
- remove the cortex with a side-sweeping, high-vacuum technique using the bent silicone I/A handpiece but avoid pulling the cortex to the center

ADVANTAGES

There are several potential advantages of the phacofirst technique, including the need for fewer instruments, faster surgical times, and a simpler procedure.

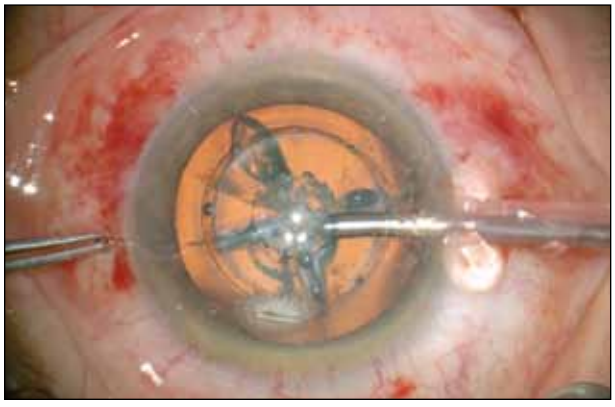

Figure 1. In the phacofirst technique, the phaco tip is the first surgical instrument to enter the eye.

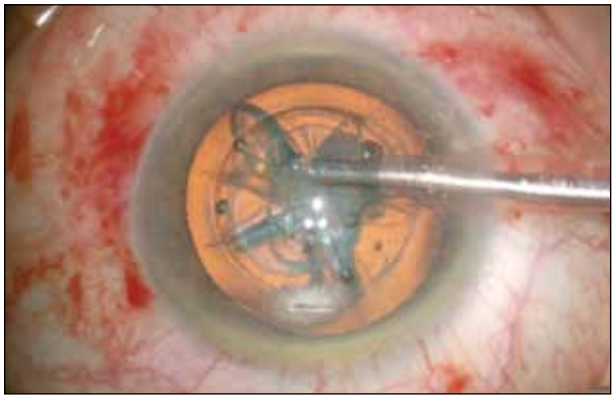

Figure 2. The surgeon uses the phaco handpiece to check the capsulotomy for any residual tags or bridges.

Without hydrodissection, the anterior chamber can be completely rather than partially filled with a viscoelastic when ultrasonic energy is applied (hydrodissection typically washes out some viscoelastic). The technique may increase safety as well, because avoiding hydrodis-

LASER CATARACT SURGERY REQUIRES SOME ADJUSTMENTS TO SURGICAL TECHNIQUE

By Neil J. Friedman, MD

Femtosecond lasers have demonstrated the ability to optimize the critical steps of cataract surgery (corneal incision, capsulotomy, and nuclear disassembly; www.optimedica.com/catalys-overview/clinical-videos).[1-3] During the past 4 years, I have had the opportunity to use OptiMedica Corporation's Catalys Precision Laser System to create accurate, reproducible, and customized corneal and lenticular incisions (corneal incisions not FDA approved). In my experience, the laser procedure facilitates the subsequent intraocular steps of cataract surgery and reduces OR time, but some modifications to my surgical technique have been necessary.

CAPSULORHEXIS

Femtosecond lasers create a precisely sized, shaped, and centered capsulotomy, and the resected capsular disc is usually free-floating. When it is free of attachments, I proceed directly to hydrodissection (discussed later) without filling the anterior chamber with an ophthalmic viscosurgical device. If I am uncertain whether adhesions are present, however, then I do inject an ophthalmic viscosurgical device into the anterior chamber, which partially or completely elevates the capsular disc off the lens' surface to improve my visualization of the free edge. If the disc is not free-floating after this maneuver, I grasp it with capsule forceps and remove the disc with a circular motion similar to my manual capsulorhexis technique. My goal is to break any "postage stamp" adhesions or uncut area (a rarity), which could cause a radial tear.

HYDRODISSECTION

Prior to injecting fluid, I gently rock the lens to allow the cavitation bubbles to escape so that capsular block does not occur. This complication has not yet been observed in more than 400 cases performed with the Catalys, but its potential exists. I have found that less hydrodissection is required because of the partial pneumodissection produced by the gas bubbles.

PHACOEMULSIFICATION

Laser pretreatment of the lens facilitates nuclear disassembly by creating exact cleavage planes. I find it easy to separate the quadrants with minimal manual manipulation, and they can be evacuated as small "aspiratable" cubes (if a lens-softening pattern is applied) with less ultrasound energy than required for my traditional manual cataract procedure. On postoperative day 1, I have noticed that eyes treated with the laser are noticeably quieter and the corneas are much clearer.

CORTICAL REMOVAL

The capsulotomy cut creates a smooth circular edge of cortex that I can easily grasp with the I/A tip directly under the capsulotomy instead of having to search deep in the bag recess for cortical strands. In my experience, this also simplifies the removal of subincisional cortex.

IMPLANTATION OF THE IOL

The precisely sized and shaped capsulotomy facilitates the IOL's insertion. The centered capsulotomy helps me to position the lens and ensures complete capsular overlap of the optic's edge. In addition, the stronger laser-created capsulotomy may be more resistant to tearing during manipulation of the IOL.[3]

CONCLUSION

I am amazed by femtosecond lasers' ability to produce a perfect capsulotomy with less deviation in effective lens position for any IOL design. Also remarkable is the reduction in ultrasound energy and intraocular manipulations made possible by the laser's precutting of the lens. Refinements in surgical technique will help ophthalmologists to take advantage of this wonderful technology.

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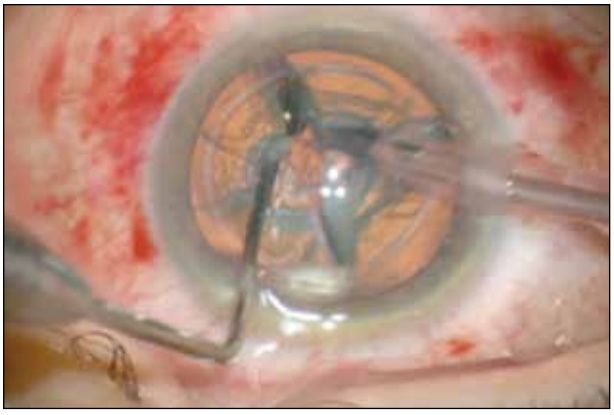

Figure 3. The nucleus is disassembled with a cylindrical chopping technique, using the phaco handpiece and a second instrument to divide the nucleus.

section may decrease the risk of extending any tears or damaging the posterior capsule. Anecdotally, the corneas are clearer, and as first described by Robert Cionni, MD, there are fewer anterior lens epithelial cells.

EARLY EXPERIENCE

The technique for nuclear removal I currently use, the cylinder chop, fits well with the phacofirst technique. To begin chopping, I create a set of nested cylinders in the center of the nucleus (Figure 3). The outer diameter of the largest cylinder is 3.5 mm but can be set to the surgeon's preference. A simple cross-chopping pattern is also programmed with its outer diameter currently set at 5 mm. Simply removing the central core seems to create enough fluid circulation to loosen the segments; in fact, I find that the harder nuclei detach from the capsule the easiest.

CONCLUSION

The phacofirst technique would be impossible without a femtosecond laser. It is just one example of changes made possible by new technology. I predict further technical and technological innovation to occur, as femtosecond lasers and phaco units become more synergistic. ■

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