COVER STORY

Six Months' Experience With Laser Cataract Surgery

My results thus far have been impressive, but the use of femtosecond laser technology does require a learning curve.

BY ROBERT J. CIONNI, MD

n our center, two other anterior segment surgeons and I have been performing laser cataract surgery with the LenSx femtosecond Laser (Alcon Laboratories, Inc., Fort Worth, TX) for the past 6 months. Select "outside" surgeons are now being certified at our center to use the laser as well. To date, I have performed more than 300 cases. This article provides an overview of my experience thus far.

WHY DID WE ADOPT A FEMTOSECOND LASER?

Because the surgeons at our center are highly skilled and detail oriented, the vast majority of our cataract patients already achieved excellent outcomes. We adopted laser technology with the goal of improving precision and refractive outcomes for *all* patients.

EDUCATING THE PATIENT

We have found it helpful for patients to have some concept of laser cataract technology in advance of their visit. They receive in the mail a brochure that discusses cataracts, cataract surgery, and the different options for its treatment, including a customized refractive laser procedure.

Before I enter the room to meet the patient, I like to know if he or she wishes to be less dependent on glasses and whether or not he or she has astigmatism. All of my patients therefore fill out a vision-preference questionnaire and undergo measurements with the Lenstar Optical Biometer (Haag-Streit USA Inc., Mason, OH) so that I understand their refractive goals and how I can help "We adopted laser technology with the goal of improving precision and refractive outcomes for all patients."

achieve them. I am therefore better prepared to discuss patients' options with them after the examination. Regardless of the IOL selected, about 35% of my patients elect to undergo femtosecond laser treatment to reduce their astigmatism at the time of cataract surgery. In my colleagues' and my experience, patients have been quick to embrace femtosecond laser technology, because they equate it with precision and typically want the most precise procedure they can afford.

I am performing both the laser procedure and phaco surgery. Because the former increases the amount of time I spend on each case by 5 to 10 minutes, I consider it to be a separate procedure and charge appropriately. Prior to surgery, I must also take additional time to design the laser plan for each patient.

DOCKING

Docking the LenSx laser is quite different than docking a femtosecond laser for creating a LASIK flap, so even experienced LASIK surgeons will have a learning curve. Although it is easy to dock the LenSx laser with a single-piece patient "It takes practice to obtain a perfect dock and avoid tilting."

interface, it takes practice to obtain a perfect dock and avoid tilting. The docking must be as flat as possible to avoid off-centered incisions and capsulotomies. With the current LenSx software, decentering the capsulotomy along the axis of moderate tilt will help to minimize any negative effects.

INCISIONS

My fellow surgeons and I began with a single-plane incision with the laser but found that it was not as watertight as a three-plane incision. Currently, we use a trapezoidal incision that is 2.3 mm internally, 2.5 mm externally, and 1.75 mm long. The incision *must* be made peripherally enough to touch the limbal vessels. Otherwise, even if created manually, it will not seal as well as a limbal incision and will induce corneal folds during phacoemulsification, limiting visualization and likely leading to more postoperative corneal edema than desired.

For corneal arcuate incisions, we program a 9-mm optical zone and 80% depth, as determined by the laser's optical coherence tomography device. We are using the Donnenfeld nomogram but reduce it by one-third. In other words, if the nomogram calls for a 60° arc, we make a 40° arc.

CAPSULOTOMY

We currently have the laser set at a 4/3 spacing strategy for the capsulorhexis, which means a laser spot separation of 4 μ m in a circumferential fashion and 3- μ m lamellar spacing of the spots. One disadvantage to this approach is that tighter spacing means a longer procedure. I prefer to keep the treatment time below 90 seconds. The energy setting of 14 mJ seems to be appropriate, with a posterior offset of 350 μ m and an anterior offset of 100 μ m. We have tried different spacing, energy levels, and offsets, but as of now, these settings seem to work the best with our laser.

Our capsulotomies are 100% complete about 75% of the time. Most of the remaining 25% have had one or two small "tags" to the peripheral capsule similar to postage stamp attachments. A few cases had larger areas of attachment, possibly due to corneal opacities or laser bubbles that interfered with the treatment. With the newer software and the speedier 50-kHz laser, this situation has become rare. I connect the attached areas in a single circular movement similar to a manual capsulorhexis to avoid peripheral extension, which occurred in a few of my early cases.

CHOPPING

The LenSx laser excels at fragmenting the lens. Compared with a two chop (four quadrants), a three chop (six segments) makes it easier for me to get the first piece out and, in my estimation, leads to more efficient phacoemulsification. A four chop (eight segments) makes it easy to remove the first piece, but I find this approach lengthens the procedure, creates more bubbles (which decrease visualization), and provides minimal benefit over the three chop.

The new software (version 2.12) allows for a combined chop and cylindrical pattern. My preference is now a twochop and two-cylinder strategy. The diameter of the chop and outer cylinder is 6 mm, and the diameter of the smaller cylinder is 3 mm. The smaller cylinder effectively severs each quadrant's apical portion to create space for segment manipulation, thus greatly simplifying nuclear removal.

FLOW

I do not yet know how safe it is for the patient to stand up and walk around after laser surgery and before the cataract procedure. In our center, we therefore use rolling chairs/beds that function as the OR bed. Several companies manufacture beds that work well for this purpose, including UFSK (Regensburg, Germany) and Brumaba (Wolfratshausen, Germany). The newest version of the MTI bed (Medical Technology Industries, Inc., Salt Lake City, UT) has greatly impressed us with regard to functionality, ergonomics, and patients' comfort, and it has become our preferred bed.

PHACOEMULSIFICATION AFTER THE LASER PROCEDURE

I inject a dispersive ophthalmic viscosurgical device before entering the chamber to confirm that the capsulotomy is complete and avoid a peripheral extension. With the Chang hydrodissection cannula (Katena Products, Inc., Denville, NJ), I perform gentle hydrodissection to avoid overexpanding a capsular bag that has already inflated somewhat with gas formed by the laser fragmentation of the lens.

I begin phacoemulsification using quadrant-removal settings and a vacuum level of 350 mm Hg (using the Infiniti Vision System with Ozil Intelligent Phaco and a 45° mini-Kelman tip [Alcon Laboratories, Inc.]). After removing the central core and burying the phaco tip in one segment, I use my second instrument to push away the adjacent segment. This process extends the laser-made chop the rest of the way posteriorly and peripherally, thereby liberating the

segment. The absence of the central core allows the segment to flow easily into the phaco tip. The remaining three segments are emulsified in a similar fashion.

CORTICAL REMOVAL AND THE IOL's IMPLANTATION

Because the laser cuts the most anterior 350 µm of cortex flush with the edge of the capsulorhexis, there are no irregular tags beneath the capsulorhexis' edge to grab. My fellow surgeons and I had become used to having these "handles" make cortical aspiration easier, so we needed to adjust our technique somewhat.

Implanting the IOL is routine, as is removal of the ophthalmic viscosurgical device. A 5-mm continuous curvilinear capsulorhexis allows for 1 mm of symmetrical coverage of a single-piece acrylic IOL's optic.

OUTCOMES

Our results with laser cataract surgery have been impressive. We are currently evaluating the predictability of the effective lens position and refractive outcomes at 1 month as an ongoing, organized study. Our early results, comparing our first 25 laser cases with 25 manually treated eyes,

show a statistically significant difference in the predictability of the effective lens position, the proximity to the targeted refractive outcome, and UCVA in favor of laser cataract surgery. These results will be presented at the 2011 AAO Annual Meeting.

CONCLUSION

Femtosecond lasers represent a quantum leap in cataract technology that is poised to markedly improve the consistency with which surgeons achieve true refractive results for their patients. My early experience with laser cataract surgery has been quite positive, but we are just "scratching the surface" of this technology's capabilities. I anticipate a tremendous growth in our knowledge that will lead to further improvements during the next few years.

Robert J. Cionni, MD, is the medical director of The Eye Institute of Utah in Salt Lake City, and he is an adjunct clinical professor at the Moran Eye Center of the University of Utah in Salt Lake City. He is a consultant to Alcon Laboratories, Inc., and



is a medical advisory board member for LenSx. Dr. Cionni may be reached at (801) 266-2283.



Find out how other facilities are expanding their capital budget.

Benefits of OUTSOURCING

Complete cataract surgery outsourcing services include:

- Top equipment choices
 Supplies and disposables
- IOLs and specialty IOLs
 Well-trained professionals

Call Today! 877-564-3937

or email SalesInfo@VantageOutsourcing.com www.VantageOutsourcing.com

