

My Laser Cataract Surgery Technique and Incision

The femtosecond laser has permitted me to make changes that are augmenting my cataract procedure.

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I was fortunate to begin performing laser cataract surgery in February 2011. It took a few months and about 200 cases for me to settle on a consistent technique, which is still subtly evolving. This article describes my approach and my incision.

CAPSULOTOMY

I routinely use a capsulotomy of 4.9 mm. This might seem small, but a maximum of 5 mm is necessary to consistently cover the optic of a 6-mm IOL. Given that there is approximately a 14% magnification factor to the entrance pupil, a 4.9-mm capsulotomy is equivalent to what appears to be a 5.58-mm capsulotomy performed manually. In retrospect, I have realized that is why my manual capsulotomy was smaller than I thought it was. My goal is symmetrical capsular coverage of the IOL and a more consistent effective lens position postoperatively. If I can achieve the latter as well as a lower chance of subtle tilting of the IOL, my refractive results should improve. That would benefit all of my patients but particularly those receiving a multifocal IOL, who are exquisitely sensitive to postoperative refractive errors.

My experience thus far bears out this wish. I have compared my absolute difference from the intended spherical error in manual cataract surgery (40 eyes) versus laser cataract surgery (45 eyes) using the AcrySof IQ Toric IOL (Alcon Laboratories, Inc.). The absolute difference from the intended spherical equivalent was 0.30 ± 0.26 D in the laser group versus 0.39 ± 0.30 D in the manual group.¹ I performed these cases while I was still changing and improving my laser capsulotomy settings, technique for

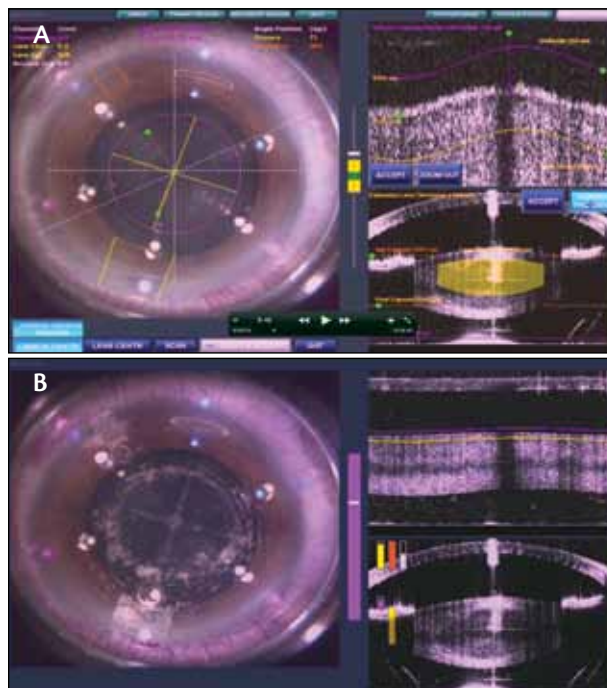


Figure. A full overlay details the intended femtosecond laser ablation (A). The eye immediately after the ablation (B).

nuclear disassembly, and wound configuration. I therefore feel certain that, when I examine the next cohort with a consistent capsulotomy and incision, I will be able to demonstrate an even greater improvement compared with what I could achieve with my best attempt using manual surgery.

Another advantage of the laser capsulotomy is that, in just over 332 cases to date, I have had no anterior (or posterior) capsular tears. With my best efforts previously, I was able to decrease my rate of anterior capsular tears to 1%. I perform many refractive cataract procedures but also many complex cataract procedures (pseudoexfoliation, loose zonules, etc.). To have no anterior capsular tears in a number of cases where I would have expected a minimum of three confirms for me that I can achieve greater safety with laser versus manual cataract surgery.

INCISION

Configuration

For my primary incision, I have settled on a three-plane reverse trapezoidal configuration, 2.6 mm internally and 2.3 mm externally. Its length is 1.8 mm. I use an energy setting of 6.2 mJ and a spot layer setting of 6:6. With this configuration, I need to hydrate the stromal wound about 50% of the time. Although it is difficult to measure the wounds in an objective way, they appear to be of better quality than I can achieve with a metal or diamond blade. After trying different configurations in my first few hundred cases, I now favor the reverse trapezoid. Although this shape might seem counterintuitive with its fairly short length, I find the resultant incision to be highly stable and of consistent quality.

On-Axis Surgery

With the femtosecond laser, I have also been able to facilitate my move to on-axis surgery. With a manual technique, my overall surgically induced astigmatism (really, wound-induced astigmatism) is 0.42 D (standard deviation, 0.23 D; range, 0.11-1.21 D). I am obsessive enough to know that my surgically induced astigmatism is 0.39 D and 0.45 D for right and left eyes, respectively. In my view, there is no point to plugging these numbers into a formula because of the large range and relatively large standard deviation. Instead, I think consistent on-axis surgery is a more appropriate approach.

For patients with up to 0.60 D of corneal astigmatism, I simply perform on-axis surgery. For those with 0.60 to 1.10 D of corneal astigmatism, I use on-axis surgery plus a single intrastromal incision in the same axis as the primary incision. The intrastromal astigmatic incision has a 9-mm radius for 3 clock hours. The settings are 60 μ m from the epithelium and 60 μ m from the endothelium. These closed incisions are truly intrastromal, so they avoid the surface irritation that is common with limbal relaxing incisions. Although I do not have a nomogram yet, this method appears to be more accurate in my hands for dealing with corneal astigmatism. It has also meant that I have only used a toric IOL

for patients with more than 1.10 D of corneal astigmatism or in cases where I cannot perform on-axis surgery and augment the effect with the laser.

Demonstrably improved safety and accuracy and my ability to achieve better results for patients are what laser cataract surgery has meant for me so far. ■

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1. Lawless M. Toric IOL implantation in femtosecond cataract surgery. Paper presented at: 43rd Annual Congress of the Royal Australia and New Zealand College of Ophthalmologists; November 20, 2011; Canberra, Australia.

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1. What is your current position on laser cataract surgery?

- Performing the procedure
- Interested in beginning to perform the procedure
- Taking a wait-and-see approach
- Not planning to adopt the procedure

2. If you are performing laser cataract surgery, has your use of this technology prompted you to alter other aspects of your surgical technique, as it has authors in this series of articles?

- Yes
- No