As I prepared this month’s “Inside Eyetube.net” column, my resident and I had just completed a somewhat complex cataract extraction. Our patient had a dense cataract that formed several years after a successful trabeculectomy for neovascular glaucoma in the context of proliferative diabetic retinopathy. Her visual potential was limited, but the dense cataract was interfering with her vision and was deemed to be medically significant as well. Her pupil was small and marked by the stigma of ectropion uvea. As this was a more or less typical cataract extraction for me, I clearly feel far removed from the world of refractive surgery. To paraphrase one of my mentors, the typical patient in my practice wishes that something as trivial as a few diopters of astigmatism were a significant problem for him or her. Having said that, I entered the field of ophthalmology because of an endless fascination with technology, and there is perhaps no greater recent development than laser cataract surgery.

**LIVE LASER SURGERY**

Stephen Slade, MD, presents a live laser refractive cataract surgery case performed during the ASCRS 2011 meeting in the video “Laser Refractive Cataract Surgery with the Alcon LenSx Laser” (http://eyetube.net/series/alconlivesurgery/2011sandiego/hasow/medium/).

Dr. Slade’s patient is a 67-year-old woman with 2.50 D of corneal astigmatism who underwent astigmatic keratotomy (arcuate incisions to 80% depth) with the insertion of a pseudoaccommodative lens, the AcrySof IQ Restor IOL +3.0 D (Alcon Laboratories, Inc., Fort Worth, TX). Prior to the patient’s arrival in the OR, Dr. Slade used the LenSx Laser (Alcon Laboratories, Inc.) to perform the capsulotomy, fragment the lens (ie, divide the lens into four quadrants, perform an astigmatic keratotomy, and create the main wound and the paracentesis incisions.) The planned placement of the incisions was displayed at the beginning of the case (including the 5.5-mm capsulorhexis), and Dr. Slade demonstrated how he fine-tuned the incisions’ placement using the system (Figure 1), registered by anterior segment optical coherence tomography. In fact, the truly triplanar clear
corneal incision can be viewed in cross-section on the optical coherence tomography image prior to its creation (Figure 2). The laser treatment was performed under suction, which was on for about 4 minutes and resulted in some subconjunctival hemorrhage.

Once in the OR, Dr. Slade located and completed his precut incisions (including the astigmatic keratectomies at the end of the case). The precut anterior capsule slipped off the anterior lens without resistance (Figure 3), and Dr. Slade proceeded to phacoemulsify the lens and complete the surgery almost effortlessly and uneventfully.

When I think again about the patient on whom I operated, I have difficulty imagining a successful employment of the femtosecond laser in the case. The potential limitations are many. I am concerned about any amount of suction on the eye of a patient with glaucoma. I probably could not (or would not want to) get a suction ring onto any eye with a bleb, and how would I make a 5.5-mm preoperative capsulorhexis through a 5-mm pupil? However, Dr. Slade noted that this technology is still in its infancy and that its true potential is just being uncovered.

FEMTOSECOND LASER TECHNOLOGY AND GLAUCOMA

Could femtosecond laser technology be used in glaucoma surgery? Malik Kahook, MD, is an associate professor of ophthalmology and director of clinical research at the University of Colorado in Denver. He argued that, although femtosecond lasers are receiving a great deal of attention for cataract and corneal surgery, their utility for glaucoma procedures and, eventually, retinal procedures should not be overlooked. “There are early laboratory efforts focused on targeting the trabecular meshwork and removing the obstructing tissue that leads to elevated intraocular pressure,” said Dr. Kahook during an interview with Glaucoma Today. “Other efforts are focused on creating channels in the sclera for egress of aqueous from the anterior chamber or to create scleral flaps and sclerostomy incisions that are accurate and reproducible with minimal collateral damage.” Dr. Kahook also noted that, in the future, retinal procedures that target various tissue layers or pathologic membranes might become possible.

Perhaps there is an opportunity for femtosecond laser technology to standardize aspects of glaucoma surgery such as the creation of the flap in trabeculectomy or the size of the ostomy. Such standardization would likely improve the procedure itself and pave the way for better-randomized trials comparing trabeculectomy with alternative procedures.

CONCLUSION

Whether readers are looking forward to their first laser cataract extraction or doubt that they will ever need the assistance of this laser, I highly recommend that they take a look at the procedure on Eyetube.net. The technology’s possibilities are many. ❘

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Figure 2. A triplanar clear corneal incision is viewed in cross-section on the optical coherence tomography image.

Figure 3. After the laser incisions have been placed, the precut anterior capsule is easily separated from the lens.