Transitioning to Laser-Assisted Cataract Surgery

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Since adopting laser-assisted cataract surgery, my procedures have been much faster and safer and patient outcomes have been much better. The femtosecond laser is an additional means of enhancing emmetropic surgical outcomes and reducing the risk of complications including posterior capsular rupture and zonular dialysis in hard cataracts due to excessive surgical manipulation. With this reduction in risk, my confidence as a surgeon has increased, and I have significantly altered how I perform cataract surgery.

The changes did not occur overnight, however. Transitioning to laser-assisted cataract surgery required a commitment to experimenting with new tools, learning new techniques, and tweaking standard surgical practices. It was a commitment I was willing to make, and, after a short learning curve, I have noticed clear benefits of incorporating this form of laser-assisted surgery.

Below is a summary of some points I learned during my initial experience with femtosecond laser technology for cataract surgery.

**WOUND CREATION**

The laser system that I use can be programmed to consistently create a three-plane corneal incision. The resulting, repeatable architecture of the cataract incision ensures a stable anterior chamber, a clear cornea, and rapid visual recovery and leads to less risk of anterior chamber collapse from instruments entering and leaving the eye.

Additionally, there is no shallowing of the anterior chamber or aqueous leak prior to opening the wound, reducing the risk for infection, anterior chamber collapse, and compromised endothelium—all possible scenarios with a manually created wound. Patients also experience less pain, as perfect corneal incisions help to reduce fluctuation in anterior chamber depth.

**CAPSULORRHEXIS**

In standard phacoemulsification, the capsulorrhexis must be carefully crafted, and this can take additional time if the patient is uncooperative or moves a lot. Any error, such as a spin-off from the capsulorrhexis or inadvertent radial tear, can force the surgeon to abort phacoemulsification and eliminate the chance for implanting multifocal, toric monofocal, or other premium IOLs.

With earlier femtosecond laser technology for cataract surgery, on occasion capsulorrhexis creation would leave some noncut segments or radial tears that needed close attention. When this occurred, I would begin the capsulorrhexis at the most clear-cut segment and tear it along the laser-cut section circumferentially, as if starting a fresh manual capsulorrhexis. With the latest upgrade of my femtosecond laser, every capsulorrhexis is complete, and in many cases free-floating. I then use the hydrodissecting cannula to separate the rhexis, pulling the inner edge to the center of the four-quarter segments. This is followed by hydrodissection and hydrodelineation.

With the presence of a free-floating capsulorrhexis, hydrodissection and hydrodelineation can be initiated immediately, which not only helps to save time but also avoids the risky step of completing the incomplete laser capsulorrhexis in an uncooperative patient.

**PRECHOP, HYDRODISSECTION, AND HYDRODELINEATION**

Because the nucleus is prechopped during laser-assisted cataract surgery, effective phaco time is optimized. I prefer a four-segment prechop approach because it allows me to bury the phaco tip inside the nucleus for quick and easy separation and emulsification. For patients undergoing clear lens extraction or those with early cataract, this is
especially beneficial because most complications occur during these steps in soft lenses. Another benefit of prechopping the lens is that it reduces the amount of stress placed on the zonules. This is particularly important in eyes with traumatic cataract, as the zonules are already weak.

In addition to reduced phaco energy, I need less hydrodissection and hydrodelineation to free the crystalline lens when I use a laser-assisted technique. This is due to the retrolenticular gas bubble produced during the femtosecond procedure, enabling pneumodissection. Additionally, because patients opting for laser-assisted cataract surgery tend to be less stressed and more cooperative, the pupil remains dilated throughout the procedure, which reduces surgery time and complication risks.

LENS PLACEMENT

Creating a perfect continuous curvilinear capsulorhexis has been a challenge of cataract surgery. Largely dependent on surgical skill, a steady hand, and patient cooperation, a well-created capsulorhexis allows precise placement of the IOL in the capsular bag. As the capsule contracts during healing, the lens should remain in the center of the bag, with no displacement or tilt.

In anxious patients who hold their breath, a substandard capsulorhexis can allow the IOL to escape from the capsular bag due to an increase in venous pressure. As the vitreous expands, it pushes the posterior capsule forward, shallows the anterior chamber and can lead to prolonged surgery or unforeseen complications. With laser-assisted cataract surgery, however, I can create an excellent capsulorhexis with repeatability. I have extreme confidence that lens placement will be smoother and lens alignment will be easier than with a manual technique. A central and perfectly circular capsulorhexis ensures a stable effective lens position and postoperative refraction.

Precise emmetropic outcomes are another benefit of laser-assisted cataract surgery, as patients paying premium prices for multifocal and multifocal toric IOLs expect maximal visual quality without any compromise in distance, intermediate, or near vision. Feedback from patients has given the clinical staff and me more confidence to further pursue implantation of these lenses. The last thing I want to see is deteriorating vision due to lens displacement out of the bag or decentration caused by irregular capsular contraction secondary to an irregular, eccentric, or oversized capsulorhexis.

HARD CATARACTS

Laser-assisted cataract surgery is my first choice in hard cataracts and in eyes with phacodonesis or zonular dialysis, as, with prechopping, the lens requires less surgical manipulation during separation of the nuclear segments. This enhances outcomes and allows me to implant premium lenses in difficult cases that might otherwise have been converted to extracapsular cataract extraction.

I also like to perform cataract surgery with the aid of a femtosecond laser in the presence of compromised corneal endothelium, such as in patients with Fuchs endothelial dystrophy. Prior to my use of a laser-assisted technique, I advised these patients to wait until the cataract was advanced for fear of corneal decompensation postoperatively. However, laser-assisted cataract surgery can be done as soon as there is blurring of vision.

CONCLUSION

Transitioning to laser-assisted cataract surgery is worth the investment in time and money. It provides patients with quicker visual recovery and is gentler to the endothelium, making it an appropriate choice for both elderly and young cataract patients. As a pain-free and speedy surgical procedure, laser-assisted cataract surgery also encourages refractive cataract patients to undergo surgery in both eyes on the same day.

Other fields of medicine have paved the way for laser-assisted surgery, and cataract surgeons are now in the midst of adopting femtosecond laser technologies. With several femtosecond lasers for cataract surgery already available and more on the way, it is safe to say that laser-assisted cataract surgery is the future. Transitioning to this technology may take time, but in the end it is worthwhile.

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