Methods to increase the accuracy and precision of cataract surgery are continually being investigated. Not only have IOLs become more advanced, with a multitude of premium lens options that require precise centration for optimal performance, but also surgeons have access to new diagnostic technologies that aid in the analysis of ocular pathologies and other symptoms affecting visual outcomes. With such developments, patients' expectations for near-perfect vision after surgical intervention have increased, and the goal of cataract surgery has become near emmetropia.

During preoperative assessment, the treating surgeon should explain every step of cataract surgery to patients, including possible problems that can occur during and after the procedure. Today, it is likely that this conversation also includes the basics of laser cataract surgery. This article reviews several surgical tips and tricks that we discovered during our learning curve.

SURGICAL TIPS

Surgeons with experience using femtosecond lasers for refractive surgery are probably more comfortable performing laser cataract surgery compared with inexperienced surgeons. Below are our top tips and tricks for success with laser cataract surgery.

Tip No. 1: Know which eyes to avoid. Inclusion criteria include adequate pupil dilation, to at least to 7 mm, as the required rhexis diameter for laser capsulotomy is between 4.75 and 5.00 mm. The required diameter for laser lens fragmentation varies between 5.00 and 7.00 mm. Although the femtosecond laser can fragment lenses with up to grade 4+ cataract, eyes with brown or black cataracts are not suitable for laser cataract surgery. Additionally, in the presence of a flat cornea and a small eye (ie, high hyperopia), we should be careful, as conjunctiva may move underneath the patient interface, causing air bubbles.

Tip No. 2: Get comfortable with the docking process. Each femtosecond laser system designed for laser cataract surgery has a different docking system. We use the LenSx Laser System (Alcon Laboratories, Inc.), which has a one-piece curved patient interface with an on-board vacuum system. The advantage of a curved patient interface is that it forms complete contact with the surface.
of the eye; however, the suction force may change with strong eye movements.

In initial cases, difficulties and complications may occur while docking the system onto the eye. To achieve adequate docking, the patient should be supine. Prior to delivering the laser, stabilize the eye relative to the laser system by asking the patient to look into the fixation light within the device. The eyes of cataract patients are different from those of young refractive patients, and the patient may not be able to see the fixation light inside the device due to dense cataract formation. Therefore, verbal guidance is more important in this population.

As with laser refractive surgery, suction break can occur during laser cataract surgery. To avoid this complication, the surgeon should not perform the procedure on patients presenting with signs of narrow palpebral fissures or other forms of eyelid pathology. If the docking and suction are well aligned, there will be no tilt of the lens (Figure 1), and partial capsulorrhexis, irregular cuts, capsular tear, and/or capsular tag will be avoided.

Tip No. 3: Take advantage of the OCT functions of the femtosecond laser. Optical coherence tomography (OCT) can be used to capture images of the anterior segment. Early in the learning curve, the surgeon is likely to notice apparent eye tilt, but this should decrease with increasing experience. Decreasing lens tilt, which can be achieved by using intraoperative OCT, should improve the quality of the capsulorrhexis.

Tip No. 4: Do not go too deep in the ocular tissue. During laser fragmentation, it is advisable to avoid going too deep within the ocular tissue. Detection of the posterior lens surface helps the surgeon maintain a safety zone and prevents cuts in the posterior capsule.3

Tip No. 5: Achieve a perfect capsulorrhexis. This is a crucial step in laser cataract surgery,3 as creating precise and predictable capsulotomies reduces the occurrence of complications. During capsulotomy, the surgeon must ensure that the view captured by the OCT scan has parallel contour, is not tilted, and does not show signs of an irregular pattern (Figure 2). To achieve a perfect capsulorrhexis, proper alignment of the docking station is a prerequisite. If the capsulorrhexis is well centered, the surgeon will see a white circular line in the plane of the anterior capsule. Even in the case of an incomplete capsulotomy (Figure 3), the capsulorrhexis can be completed successfully using a contour-guided capsulotomy with a safety zone of 600 µm. We perform capsulotomy in these cases by scanning a cylindrical pattern, starting at least 300 µm below the anterior capsule and ending at least 300 µm above the capsule. Contour-guided capsulotomy was developed to help surgeons correct for a tilted lens.

Tip No. 6: In eyes with astigmatism, double check topography and refraction values. If astigmatism is 3.50 D or less,
laser-assisted astigmatic keratotomy can be performed to flatten the steepest meridian of the cornea. Laser systems create incisions with more precise depths, axes, optical zones, and arc lengths than manual techniques. These cuts can be opened at the same time as surgery or days after. Incisions should be in clear cornea, as limbal incisions may involve vessels, and they should be trapezoidal to provide optimal wound integrity.

**Tip No. 7:** Open corneal wounds carefully. Stroma in the incision may be adherent, creating resistance to opening with a blunt spatula pushed directly into the wound. Opening such corneal cuts should be performed with minimal rotation, similar to lifting a femtosecond-LASIK flap, and force should not be applied to the wound.

**Tip No. 8:** Dilate the pupil if necessary. Stimulation of miosis is possible due to dissipation of energy into the anterior chamber, and adequate pupillary dilatation can be achieved with an injection of intracameral adrenaline.

**Tip No. 9:** Remove the anterior capsule tangentially and gently. This can be achieved with a cystotome or forceps.

The surgeon should follow the contour of the rhexis, as small tags can be adherent.

**Tip No. 10:** Perform hydrodissection carefully, if needed. Hydrodissection is not always necessary. If it is, however, it should be done after adequate decompression of the anterior chamber. Hydrodissection should be gentle, using multiple short pulses. If rapid accumulation of fluid behind the lens occurs, it can be a precursor for capsular instability. During hydrodissection, air bubbles at the posterior capsule indicate the potential for complications. They can be removed by pushing the lens back in soft cataracts; in hard cataracts, they can be removed by dividing the nucleus.

**Tip No. 11:** Choose the appropriate pattern for lens fragmentation. If the lens is soft, the surgeon may choose concentric rings or a cylindrical pattern to obtain nucleus liquefaction. Cutting patterns can be placed on the nucleus to soften harder cataracts. Phaco chop is more suitable for harder lenses, but a hybrid pattern that combines cylinder with chop is better for rapid lens removal with minimal phaco usage.

**CONCLUSION**

During the learning curve, complications are not just possible; they will occur. However, our experience suggests that none are of a serious nature. Subconjunctival hemorrhage may occur as a result of the femtosecond cataract treatment, but it is usually clinically insignificant and painless. Identifying and excluding eyes at risk for particular complications can help to reduce the probability of their occurrence, and previous experience with refractive femtosecond laser systems can decrease the learning curve.

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