

COVER STORY

Surgical Pearls for RLE

In addition to performing a perfect capsulorrhexis, it is important to focus on the incision architecture, anterior chamber stability, anterior capsule polishing, and IOL centration.

BY BRIAN LITTLE, MA, DO, FRCS, FRCOPHTH

Between the recent advances in IOL technology (ie, presbyopia-correcting IOLs) and the trend of performing cataract surgery earlier in a patient's life, refractive lens exchange (RLE) is gaining momentum as an attractive option for patients. Although there is not yet an ideal solution for loss of accommodation, which is the main side effect of presbyopia, RLE is a laser-free solution that provides patients with quick visual recovery and the potential to eliminate spectacle dependence. However, RLE requires careful patient selection, comprehensive counseling and adequate chair time, and an exact technique with a low margin for error. Within this realm, the surgeon must perform accurate biometry and select the appropriate IOL for the individual patient.

The first rule of RLE is to under-sell and over-deliver; the only way to exceed the patient's expectations is to perfect your surgical technique. There are five main areas to concentrate on: incision architecture, capsulorrhexis, anterior chamber stability, anterior capsule polishing, and IOL centration. Although I was at first tentative to perform RLE on my patients, I have found that results are promising and the majority of patients are happy with their outcomes.

SURGICAL PEARLS

Incisions. I suggest performing RLE in patients who have near-spherical corneas, aiming to maintain sphericity and avoid induced astigmatism. For RLE, the incision should be stable and watertight: I prefer a scleral incision (Figure 1), either grooved or uniplanar, instead of a corneal incision. Although the angle of approach is flatter, the learning curve is short.

Simply keeping the external entry site reasonably anterior seems to lessen the burden of creating the scleral incision. The time it takes to make the incision is similar to the

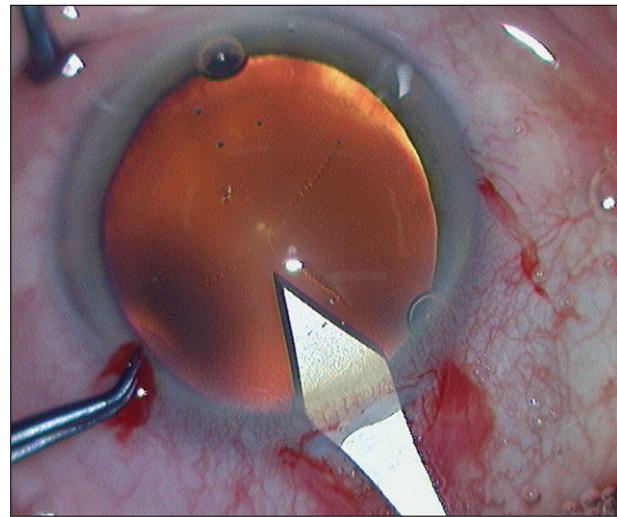


Figure 1. The single-plane scleral tunnel is 2.85 mm.

time for a corneal incision, and it better accommodates the IOL injector—because of its elasticity—and rapidly seals without stromal hydration. This self-sealing incision allows improved chamber stability, especially during removal of the phaco tip, and minimizes forward movement of the vitreous body during surgery. Typically, RLE patients are younger and therefore may not have yet experienced posterior vitreous detachment.

Capsulorrhexis. When we implant a presbyopia-correcting IOL, it is important that the continuous curvilinear capsulorrhexis (CCC) be not only centered and circular but also the correct size.

But what is the correct size?

For starters, the CCC should completely overlap the edge of the optic, which aids in placement of the IOL in the correct optical plane and provides good centration. I make the CCC approximately 1 mm in diameter smaller

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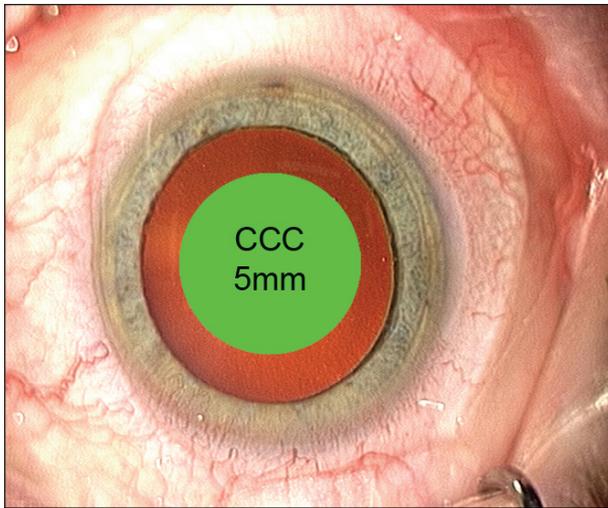


Figure 2. A 5-mm circular overlay, which is half of the vertical corneal diameter, is used to gauge the capsulorrhexis free-hand.

than the diameter of the optic. For example, if I implant a 6-mm optic, I create a 5-mm CCC. The anterior capsule overlap will be 0.5 mm around the entire optic. The surface area of a 5-mm compared with a 4-mm CCC is 33% larger. However, it is still safe to create the 4-mm CCC if it is your preference. This capsulorrhexis size will overlap the 6-mm optic by 1 mm on all sides. I do not suggest making the CCC any smaller than 4 mm. A 3-mm CCC has a surface area that is 66% smaller than a 5-mm CCC.

The largest drawbacks to using a CCC smaller than 4 mm include the risks of capsular block, anterior capsular tear, and postoperative anterior capsular phimosis. Additionally, multifocal IOLs have larger optics that

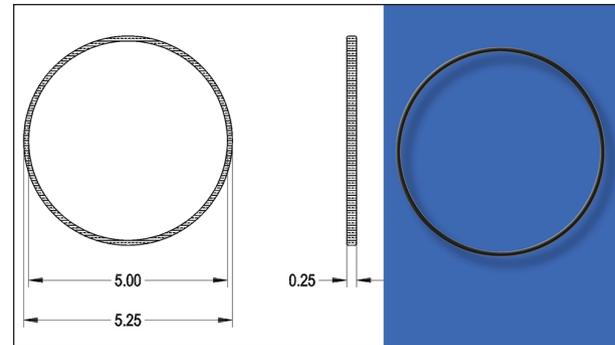


Figure 3. The Ring Caliper accurately sizes the capsulorrhexis.

extend outside the smaller CCC. As examples, the Restor (Alcon Laboratories, Inc., Fort Worth, Texas) has a 3.6-mm functional central diffractive zone, and the ReZoom (Advanced Medical Optics, Inc., Santa Ana, California) has five concentric refractive zones that extend beyond 5 mm.

Now that we have established the adequate size for a CCC, we can focus on learning how to consistently create a CCC of that dimension. Most of this boils down to experience; however, there are two general rules: (1) use the pupil as a reference for circularity and centration, and (2) for size, use the vertical corneal diameter (which is fairly consistently 10.5 mm) as a guide. Make a circle half this size on the center of the capsule. The cornea-to-CCC ratio should be 0.5 (Figure 2).

If you prefer to work from a template, temporarily place the Ring Caliper (Morcher GmbH, Stuttgart, Germany; Figure 3) on the anterior capsule. With either 5- or 6-mm internal diameters, the Ring Caliper creates a template for 4.75- and 5.75-mm CCCs, respectively.

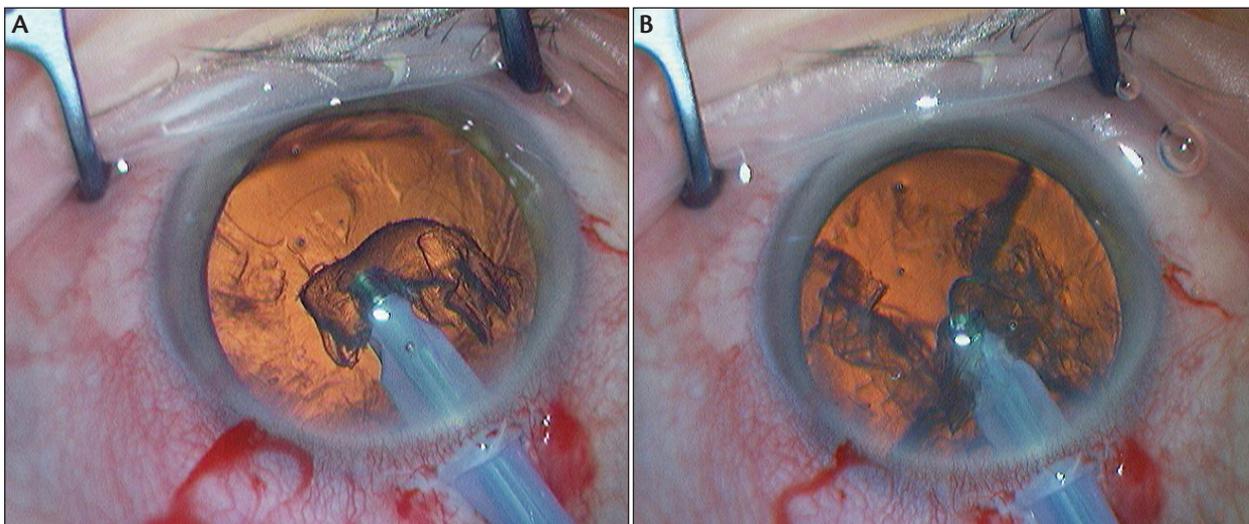


Figure 4. (A) One-handed removal of the final nuclear fragment. The posterior cortical fibers are defocused as the capsular bag remains fully inflated. (B) Removal of the first nuclear fragment is seen.

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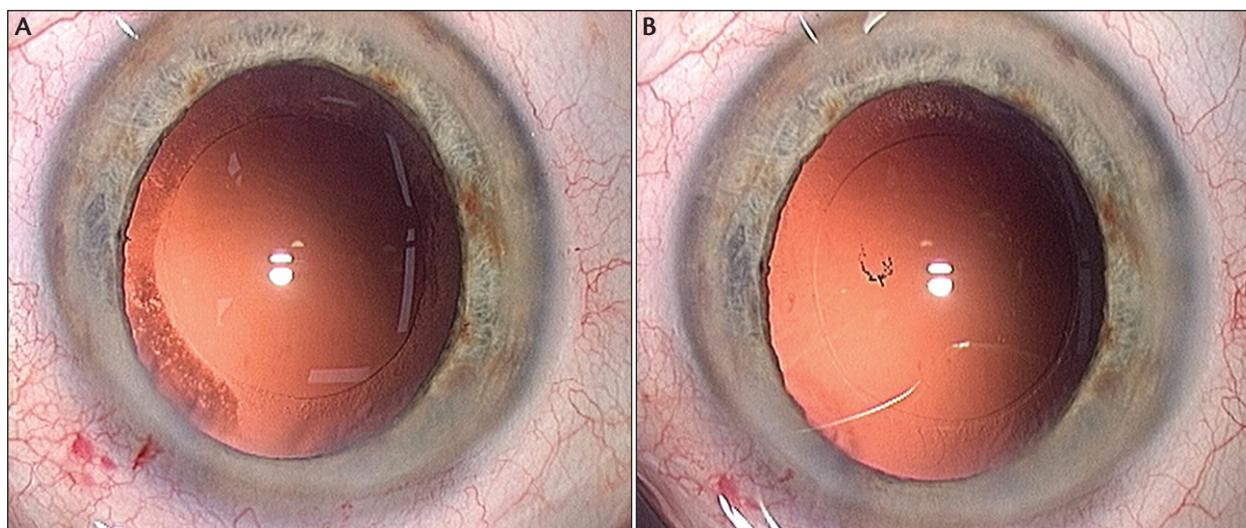


Figure 5. (A) The lens epithelial cells are seen before performing anterior capsular polishing. (B) A clear anterior capsule and empty bag are seen after polishing.



Figure 6. Contrast is notable between adjacent polished and unpolished areas of the anterior capsule.

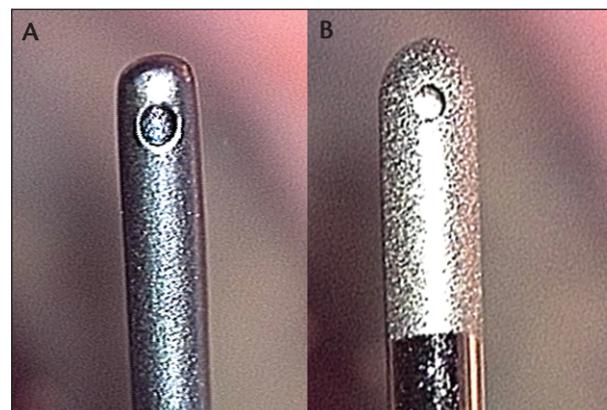


Figure 7. (A) Reusable and (B) disposable bimanual aspiration cannulas.

Alternatively, capsulorrhexis forceps with calibrated shafts can provide a reference for CCC creation; however, the shafts have the tendency to shift as the forceps are manipulated.

Anterior chamber. Obviously, the more stable the anterior chamber, the better. The biggest tip I can give to other surgeons is to try removing the second instrument from the eye as you remove the nuclear fragments during phacoemulsification (Figure 4). Although this technique is not widely practiced, in my experience, withdrawing the second instrument during phaco prevents leakage through the side-port incision. Leaking wounds contribute to chamber instability and endanger the posterior capsule. Be aware that possibly more chatter may occur after you remove the second instrument; however, if needed, you can easily reinsert the second instrument to minimize chatter.

Withdrawing the second instrument is especially effec-

tive during removal of the final nuclear fragment because it keeps the bag inflated and the posterior capsule out of harm's way.

Anterior capsule. Polishing the anterior capsule is a helpful enhancement, in my opinion, and it takes only a couple of additional minutes. Removing as many lens epithelial cells (LECs) from the anterior capsule as you can reduces the risk of anterior capsule fibrosis, phimosis, and posterior capsular opacification.¹

The best time to perform anterior capsule polishing is after the IOL is implanted because the capsule is under tension and the IOL protects the posterior capsule. Use high magnification, and carefully position the eye so that the optimal red reflex is obtained. The LEC layer should be visible, resembling a mottled geographic appearance on the rim of the anterior capsule (Figure 5). Polished and unpolished areas are easily distinguishable during aspira-

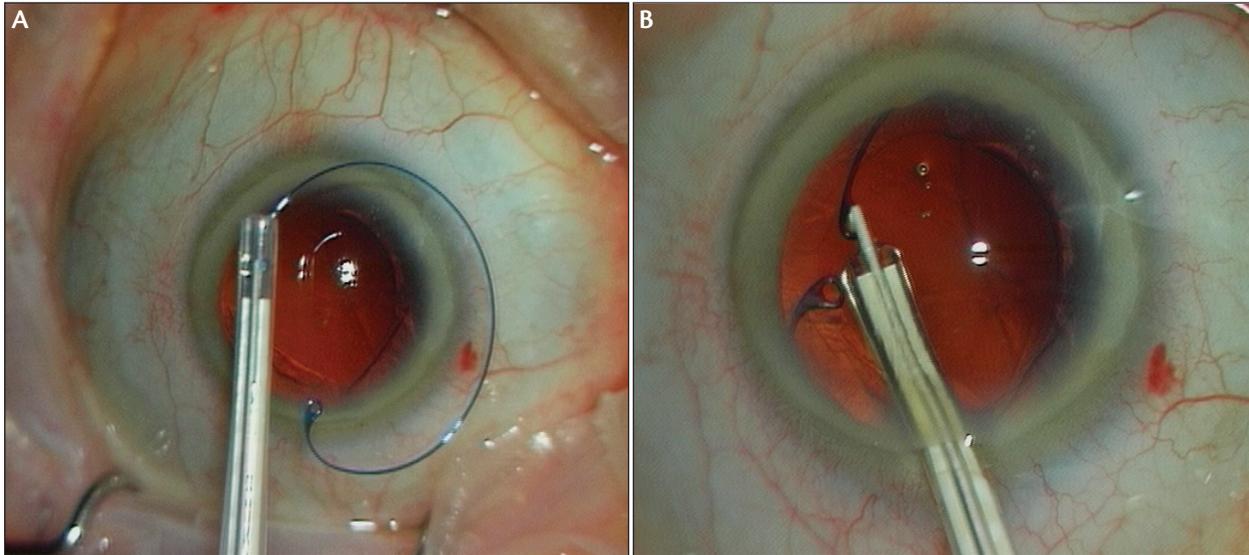


Figure 8. (A) The Type 13 CTR has a soft and curved leading shoulder. (B) Injection of the CTR.

tion of the dusty layers (Figure 6). When I am polishing the anterior capsule, I prefer to use bimanual I/A because it provides me with 360° of access to the capsule. Before trying this technique, check under high magnification that the port on the aspiration cannula has a polished edge. Many disposable instruments have a sharp, unpolished edge; alternatively, reusable instruments have a polished or chamfered edge (Figure 7). If coaxial I/A is your technique of choice, you can still remove all LECs; however, subincisional access is easier with bimanual instruments.

IOL centration. Centration is functionally more critical with multifocal IOLs, and therefore decentration is more of a worry. To avoid it, carefully implant the IOL so that it is centrally located within the capsular bag. Be sure to double-check the position after removing the ophthalmic viscosurgical device (OVD). After surgery, IOL decentration may occur for several reasons.

TAKE-HOME MESSAGE

- RLE is a laser-free solution that provides patients with quick visual recovery and the potential to eliminate spectacle dependence.
- The only way to exceed the patient's expectations is to perfect your surgical technique.
- The incision should be stable and watertight.
- The CCC should completely overlap the edge of the optic.
- During nuclear fragment removal, Dr. Little suggests removing the second instrument when it is not being used. This enhances chamber stability.
- The best time to perform anterior capsule polishing is after IOL implantation.

First, if the implant is smaller than the capsular bag, decentration may occur—most readily in large eyes with high myopia. Second, decentration may occur because of capsular fibrosis and contraction, which was a common occurrence with older, silicone plate haptic IOLs. Third, unexpected capsular contraction may take place due to diffuse zonular weakness and laxity or early postoperative inflammation.

My preference for multifocal IOL insertion includes the use of a capsular tension ring (CTR). After the capsular bag is empty and an OVD is used to inflate the bag, I deliver the Morcher CTR (Type 13; Morcher GmbH; Stuttgart, Germany; Figure 8) into the empty bag. This model CTR is designed with a curved leading shoulder so that it does not snag.

Adding the CTR into my surgical technique has provided me with more security.

CONCLUSION

RLE is a newer surgical endeavor, and we do not yet have an approach as systematic as we do for cataract surgery; however, by following the five pearls I have outlined, predictable and successful RLE outcomes are more likely to be achieved. ■

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1. Sacu S, Menapace R, Wirtitsch M, Buehl W, Rainer G, Findl O. Effect of anterior capsule polishing on fibrotic capsule opacification: three-year results. *J Cataract Refract Surg*. 2004;30:2322-2327.