

Tips for Successfully Implanting the Crystalens

A discussion of how to achieve refractive predictability, prevent subluxation, and improve accommodation with this lens.

BY OMAR F. ALMALLAH, MD

All ophthalmic surgeons have heard the cliché *underpromise and overdeliver*. This was and remains good advice for the treatment of surgical pathologies. I do not believe the approach is appropriate, however, for a modern refractive cataract practice and presbyopic correction. Patients are now asked to pay out of pocket for the uncovered upgrades of presbyopia-correcting IOLs. Their expectations are therefore justifiably greater than those of patients undergoing conventional cataract surgery. If presbyopic correction is for what patients paid, that is what they receive, and it has to work reliably for them, barring a significant surgical complication. Imagine a commercial airline that promised, “Fly with us. We will get you there—maybe.” I do not think it would be a successful slogan. We surgeons have adopted this attitude of underpromising in ophthalmology. I therefore was not surprised when my fellow audience members and I reported that anywhere from zero to 20% of our patients were choosing presbyopia-correcting IOLs during an informal poll, conducted at a session on presbyopic correction during the ASCRS Symposium on Cataract, IOL and Refractive Surgery in April 2007. I have no doubt that, similarly, air travel

would lose its popularity if airlines could not reliably get people to their destinations.

Fully correcting a patient’s vision is a noble goal and is

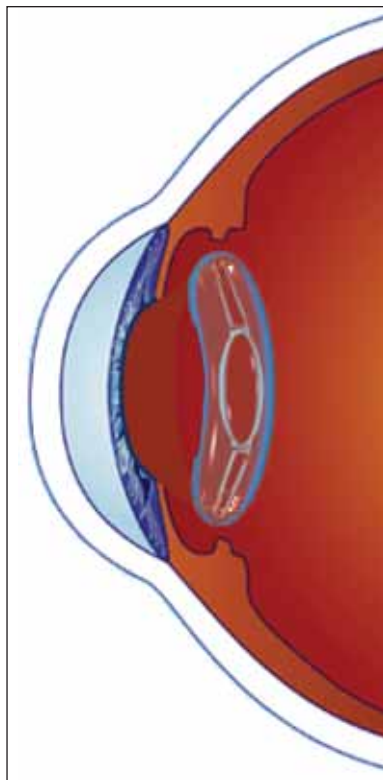


Figure 1. The surgeon properly orients the Crystalens in the bag with its optic showing acutely angulated haptics and the loop arch haptic lengths (or segments) seated in the bag so that there are no capsular striae.

our objective for all patients who undergo cataract surgery. We cannot provide this degree of correction to every patient, however; some have macular pathology or lack the financial resources to pay for the uncovered presbyopia-correcting IOL, for example. If no barriers to costs exist, spectacle-free vision is a logical choice for patients. I do not know anyone who loves presbyopia. I think it is time to present the option to every suitable candidate.

This article provides my recommendations for improving presbyopes’ vision with the implantation of a Crystalens accommodating IOL (Eyeonics, Inc., Aliso Viejo, CA) and maintaining the lens’ proper positioning within the capsular bag for successful postoperative outcomes.

AN IOL’S POSITION

Success with presbyopia-correcting IOLs depends heavily on refractive predictability. We ophthalmologists understand the importance of accurate biometry and keratometry, surgeon-specific A-constants, and the appropriate choice of IOL power calculation formulae.¹ We some-

times pay too little attention to making sure the IOL remains in the proper position within the capsular bag after its implantation (Figure 1). Subtle changes in an IOL's location can result in significant refractive changes and are often an unrecognized reason for refractive surprises and even poor accommodative results.

The position of the Crystalens accommodating IOL is particularly important. This thin, flexible implant can lose its precise position in the capsular bag if the anterior chamber becomes shallow at any time intraoperatively (Figure 2A). The displacement can occur when the surgeon removes the viscoelastic from the anterior chamber and takes out the I/A instrument's tip. Subsequent deepening of the anterior chamber may not restore the IOL's original seating.

The Crystalens' haptics may move out of position from the deepest recesses of the fornix of the capsular bag, and they may not return to their original position upon the reformation of the anterior chamber with balanced salt solution. Another reason for the haptics' dislocation is that, after the viscoelastic's removal from the eye, the capsular bag will not expand like it did before. Finally, the haptics may be captured in a position that is eccentric and different from the original implantation site, which causes a subtle asymmetry to the IOL within the bag (Figure 2B). Striae in the posterior capsule are a clue that the IOL has shifted. Further pressurizing the anterior chamber may temporarily eliminate capsular striae, but they are frequently visible the next day at the slit lamp due to the improper fixation of the implant in the bag.

The most common intracapsular dislocation is anterior, which explains why nearly all of the refractive surprises in the absence of miscalculated IOL powers with the Crystalens are myopic. The other significant complication of intracapsular dislocation is the patient's loss of accommodative function, which depends on the transmission of forces of the ciliary muscle from the capsular bag to the flexible Crystalens implant. If the capsular bag does not have unhindered contact with the full plate

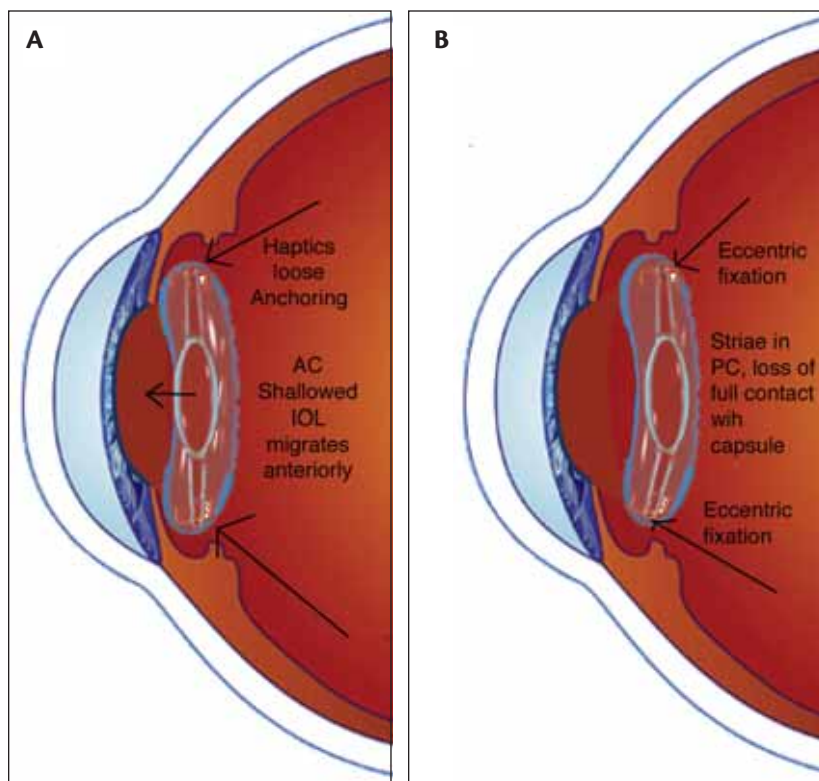


Figure 2. The anterior chamber becomes shallow after the Crystalens' optic, haptics, and loop arch haptic lengths lose their proper anchoring (A). After the author reforms the anterior chamber, the Crystalens may not be properly seated, because the loop arch haptic lengths could get caught in a loose bag. As a result, full contact of the IOL and haptics with the bag may be lost, which will degrade accommodation and/or present a myopic surprise (B).

and loop arch lengths of the Crystalens' haptics, the degradation or loss of accommodative function is likely. This phenomenon may also play a role in refractive surprises following the implantation of a multifocal IOL. Surgeons therefore must adopt a strategy to avoid the shallowing of the anterior chamber after an IOL's implantation. Implementing the smallest possible incision is a priority. I use a 2.8-mm trapezoidal clear corneal incision for implanting the Crystalens with the STAAR plate haptic injector and the MTC-60c cartridge (both from STAAR Surgical Company, Monrovia, CA).

THE PREVENTION OF SUBLUXATION

Preventing the anterior chamber from becoming shallow once the Crystalens is seated is key to a successful result. I recommend surgeons reduce or, if possible, eliminate the sideport incision, which in my experience is a major source of leaky wounds. If elimination is not an option for bimanual surgery, then I suggest a

proper square or nearly square clear corneal sideport design. In such cases, I favor square or nearly square clear corneal incisions with either the Williamson or Langerman modification of Fine's design.² Before removing the viscoelastic from the anterior chamber, I perform stromal hydration of the sideport incisions (if applicable), the lateral walls of the clear corneal incision, and, most importantly, the roof of the clear corneal incision. Next, I preplace a suture to close the wound, but I leave it untied. Lastly, I proceed with I/A to remove the viscoelastic.

“If any striae are present, simply deepening the chamber or repositioning the IOL is inadequate.”

I have found that following the aforementioned steps prior to performing I/A maintains a deep anterior chamber and prevents the subluxation of the Crystalens. The hydrated clear corneal incision acts as a one-way valve, allowing the I/A instrument's tip into the anterior chamber but not permitting the aqueous to exit when the tip is removed.

A hydrated clear corneal incision is critical. No striae should appear in the posterior capsule, but the sharp angulations of the hinge should be visible while the patient is on the operating table. If any striae are present, simply deepening the chamber or repositioning the IOL is inadequate. If necessary, surgeons should inject a viscoelastic to reinflate the bag and remove all capsular folds—particularly in the deep fornices of the capsule—before repositioning the IOL. This process ensures proper fixation before the conclusion of the case. Ensuring that the Crystalens is properly positioned until wound healing secures the location of its haptics will decrease patients' loss of accommodation. By preplacing the suture, surgeons avoid having to manipulate the wound, which may lead to a shallow chamber at the end of the case. I feel it is very important to use a suture when implanting the Crystalens.

LATE COMPLICATIONS

Properly preparing the capsular bag prior to implanting the IOL can reduce the incidence of enduring complications. Surgeons should thoroughly vacuum the interior of the capsule to remove lens epithelial cells and polish the posterior capsule regardless of how clean it appears. It is also worth noting that, because a

round capsulorhexis is more likely to fibrose in a symmetric fashion and is therefore less likely to exert asymmetric forces on the implant, its use reduces the risk of Z-syndrome or late subluxation.³

Occasional refractive surprises are inevitable, and they are easily addressed with keratorefractive surgery and/or piggyback lens implants.

CONCLUSION

Only with proper implantation will patients achieve accommodative function with the Crystalens. The techniques described herein allow me to deliver excellent results with this IOL consistently.

Because 1.50 D of accommodation is not adequate for many of my patients, I target their nondominant eye for -0.75 D and their dominant eye for emmetropia. I do not consider this approach to be monovision, because a -0.75 D eye will see 20/30 or better uncorrected at distance. I perform limbal relaxing incisions for astigmatism of 0.50 D or more, and I postoperatively employ customized ablation to eliminate any residual ametropia or aberrations that are clinically significant. Sometimes, a result that is 0.25 D off is sufficient reason for further surgical intervention. This much precision requires a great deal of commitment, but the rewards to patients and myself are commensurately great. ■

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