Correcting Capsular Contraction After Crystalens Implantation

To address refractive error with capsulotomy, I use the Ellex Ultra Q.

BY HARVEY L. CARTER, MD

Unlike standard monofocal lenses, which are rigid, the dynamic mobility of the first-generation Crystalens accommodating IOL (Eyeonics, Inc., Aliso Viejo, California) created a need to address refractive error resulting from capsular contraction. Because this tightening occurred with the Crystalens, I concluded that accommodating IOLs move in the eye.

ONLY HISTORICALLY SIGNIFICANT

Since the introduction of the square-edge design of the Crystalens AT45SE (Eyeonics, Inc.), the *Z*-capsular contraction syndrome has become a matter of historical significance: it has never been reported with the second- or third-generation of square-edge Crystalens implants (Eyeonics, Inc.). Because this modified lens design changed the lens capsule's ability to move the implant, it is now necessary to hypothesize what makes lenses move, and what stops them from moving.

Although the theory of capsular contraction was previously known, it had little clinical significance until the development of the Crystalens. In cases when patients underwent standard capsulotomies with a rigid lens (eg, AcrySof; Alcon Laboratories, Inc., Fort Worth, Texas), significant refractive change did not occur. In the case of the first-generation Crystalens, however, capsular contraction could significantly change the refractive power, due to the lens' moving in the eye.

PRECISE PLACEMENT

To address refractive error caused by capsular contraction in patients who received the first-generation Crystalens, I have used the Ellex Ultra Q Nd:YAG laser (Ellex Medical Lasers Limited, Adelaide, Australia)(Figure 1), since June 2006.

This laser has a small plasma breakdown area, allowing precise placement of the opening in the anterior and posterior capsules. This placement is achieved through wide cone angles that allow an accurate and titrated use of the laser energy.

Figure 1. The Ellex Ultra Q Nd:YAG laser.

Once capsular contraction has caused a refractive error, I postpone laser treatment until approximately 12 weeks after lens implantation, to allow complete stabilization of the blood aqueous barrier. In my practice, I have performed nearly 2,000 Crystalens implantations.

The Nd:YAG laser procedure is best done with an assistant to help to stabilize the patient's head. Without an assistant, the patient may move during the procedure, which will negatively impact the success of his/her treatment. I recommend using a head strap and asking the patient to put his hands on the handles of the Ultra Q to keep himself stable. Having standard set-up techniques for preparing, positioning, and stabilizing the patient will result in more accurate and consistent outcomes.

If you ignore these techniques while attempting a fast turn-around, it will lead to less reliable outcomes, because the Nd:YAG treatment techniques achieve the best results by small, precise, discreet placement of the Nd:YAG shots.

FIRST GENERATION

Previously, when a patient had the *Z*-capsular contraction syndrome with the first-generation nonsquare-edge AT-45, a

-3.00 D +5.00 D X 090 refractive error could be eliminted with precise Nd:YAG treatment. This high amount of non-keratometric astigmatism along the long axis of a vertically oriented first-generation Crystalens represented the classic findings of a Z-posterior capsular contraction syndrome. With carefully placed titrated selective Nd:YAG capsulotomies, it was possible to have a refractive error of -0.05 sphere by the next day. Today, patients with anterior capsular contraction syndrome undergoing Nd:YAG laser treatments may notice a rapid improvement of up to 0.50 D to 1.50 D of accommodative amplitude. In the case of posterior capsular contraction syndrome, I have seen more than 4.00 D of refractive nonkeratometric astigmatism eliminated in one Nd:YAG treatment session.

I have found that patients who have excessive inflammation in the postoperative period will have a higher rate of capsular contraction. Additionally, patients who are noncompliant with postoperative steroid and NSAID use have an increased risk of complications.

It is important to remember that there have been no reported cases of *Z*-posterior capsular contraction syndrome causing refractive complications since the advent of the new Crystalens square-edge lens implant designs. This indicates that an adjustment in IOL design has changed the lens capsule epithelium's fibrosis and the contractile force's ability to impact an IOL's movement and refractive power. This will be important for researchers to note as they continue to develop better IOLs.

I did not experience a learning curve with the Ellex Ultra Q, as all the basic settings are relatively standard. I believe the development of this laser is monumental for refractive surgery, and the Nd:YAG laser has now proven itself capable of being used as a refractive instrument when used in conjunction with a dynamic accommodating IOL.

Gone are the days when we were blowing out the entire posterior capsule. With this technology, I believe we are entering an era of unequivocal refractive management of these lens implant patients, with precise Nd:YAG laser treatments. ■

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