Seven Tips for Successfully Implanting the Crystalens

Advice for maximizing the benefits of the HD and Five-O models.

BY D. MICHAEL COLVARD, MD

The Crystalens (Bausch & Lomb, Rochester, NY) can provide cataract surgery patients with a full and improved range of visual function without reducing the quality of their vision. Patients need not endure a period of neuroadaptation postoperatively, and their dependence on spectacles generally decreases after the IOL's implantation.

Achieving optimal results with the Crystalens HD or Five-O, however, requires you to pay greater attention to detail than is customary with monofocal lenses. IOL surgery for presbyopic correction is intrinsically a refractive procedure. The level of patients' satisfaction with the Crystalens depends on your ability to achieve a desired refractive outcome. To give patients the highest level of spectacle independence, you must manage their astigmatism effectively and provide them with their best possible UCVA. Here are several tips I have found helpful in achieving this goal.

TIP No. 1. MAKE A DETAILED DIAGRAM OF YOUR PLAN FOR MANAGING ASTIGMATISM

There is a general perception among ophthalmologists that limbal relaxing incisions (LRIs) are forgiving and therefore do not have to be very precise. Only the first part of this statement is true. LRIs are maximally effective only if they are placed in the proper location(s) and subtend the correct arc(s). It is useful to make a diagram based on keratometric and topographic findings that exactly describes your plan for surgically managing astigmatism (Figure 1). This drawing should describe the planned location of your primary incision and the size and exact location of the LRIs. I tape the diagram to the microscope or on the wall next to the patient before each case so that I know precisely what I need to do once I sit down. If you prefer to operate on the steep axis whenever possible (as I do), the diagram also helps the nurses to orient the microscope correctly before you enter the room.

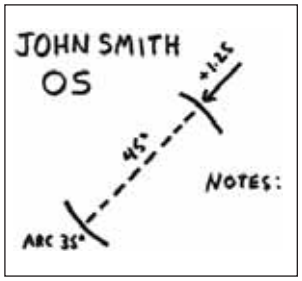

Figure 1. Create a diagram of the planned location of the primary incision and of the location and size of LRIs.

TIP No. 2. MARK THE HORIZONTAL AND VERTICAL AXES PREOPERATIVELY WHILE THE PATIENT IS IN A SEATED POSITION

It is important to establish precisely the primary horizontal and vertical axes before the patient lies down. One approach is simply to touch the sclera with a surgical marking pen at the limbus at 0°, 180°, and 270° while the patient is sitting upright outside the OR (Figure 2). Once you begin to mark these axes preoperatively, you will quickly realize that cyclotorsion is not inconsequential. For a majority of patients in the supine position, the eye experiences a downward temporal rotation of approximately 20°. Failure to take cyclotorsion into account guarantees that you will place your LRIs in the wrong axis and that their effectiveness will be reduced.

Figure 2. Mark the 0°, 180°, and 270° axes while the patient is upright.

TIP No. 3. MARK THE LOCATION OF THE STEEP AXIS AND THE LOCATION AND EXTENT OF LRIs UNDER THE MICROSCOPE

Once the patient has lain down and is in position under the microscope, use the horizontal and vertical markings you made preoperatively to position the axis indicator (Figure 3). If you prefer to operate on the steep axis, mark its location for the primary incision and the location and size of the LRI(s). If you always prefer to operate temporally, mark only the location and extent of the LRIs. It should

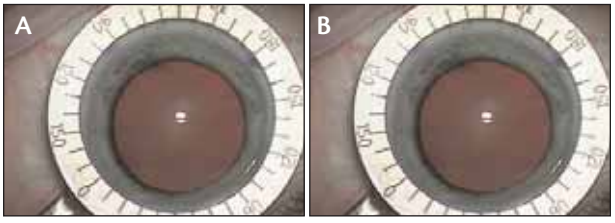

Figure 3. Using the horizontal and vertical markings to position the axis indicator (A), establish the location of the steep axis and LRIs under the microscope (B).

be understood that, when placed off axis, even a small, relatively astigmatically neutral temporal incision may produce vectors of force that can influence the final postoperative astigmatic outcome. It is for this reason that I prefer to operate on the steep axis whenever doing so is feasible.

TIP No. 4. CONSTRUCT A WATERTIGHT INCISION

The slightest bit of shallowing of the anterior chamber postoperatively can result in a forward vaulting of the Crystalens and the induction of myopia. The primary incision must be watertight, and sideport incisions must be beveled and well hydrated at the conclusion of the case to prevent a loss of chamber volume. Corneal incisions should be sutured, but a well-constructed scleral tunnel incision with an internal corneal flap of 1.5 mm or more usually does not require a suture (Figure 4). The scleral tunnel incision may seem a little "retro," but, in general, I prefer it for eyes receiving the Crystalens. I tell patients

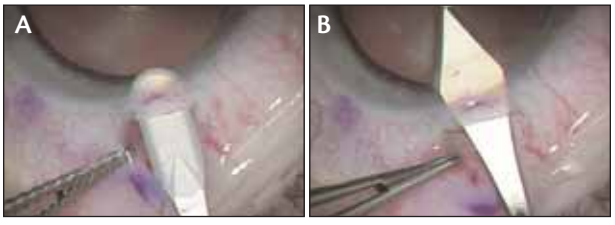

Figure 4. Use a scleral tunnel or a sutured corneal incision to ensure absolute stability of the anterior chamber. A well-constructed scleral tunnel incision started 1 to 2 mm posterior to the limbus (A) and carried at least 1.5 mm into clear cornea (B) usually does not require a suture.

that they will notice a little red spot on the surface of their eye postoperatively that will go away in a week. I find this explanation simpler than telling them they will have a suture in their eye that will require removal. Patients seem to find a red spot easier to accept. It requires less explanation and no additional intervention.

TIP No. 5. PAUSE DURING INJECTION TO CHECK THE IOL's ORIENTATION

It is possible to implant the Crystalens upside down if you are not careful. This error can occur if the IOL is improperly loaded in the inserter or if the lens rotates excessively in the inserter during injection. You can easily verify the IOL's correct orientation by pausing during injection to inspect the flat circular knobs at the ends of the polyamide haptics as they exit the inserter. The lens is designed so that, when its proper side is up, the knob to the right is always rounded (round on right) and the knob to the left is oval (Figure 5). If you see that the knob on the right is oval, rotate the injector 180º before the optic of the IOL leaves the inserter. You may then easily insert the Crystalens so that it is correctly oriented.

Figure 5. Pause during the Crystalens' insertion to inspect its distal polyamide haptics in order not to insert the IOL upside down. The round tip should always be on the right.

TIP No. 6. LIFT AND FOLD THE PROXIMAL HAPTIC INTO THE CAPSULAR BAG DURING THE IOL's INSERTION

There are many ways to place the Crystalens in the capsular bag. I find that the lift-and-fold technique is the easiest and most reliable and that it places a minimal amount of stress on the zonules (Figure 6). Using this approach, you inject the IOL so that the distal haptics are in the bag

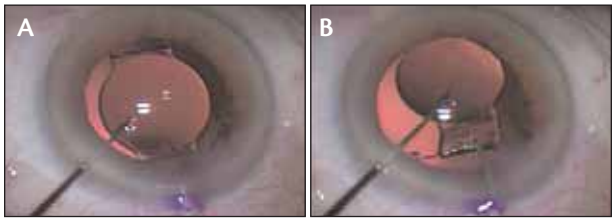

Figure 6. For capsular placement of the IOL, inject the distal haptics into the bag and "park" the proximal haptics in the anterior chamber on the anterior surface of the iris (A). Then, lift the optic with an instrument through the sideport, fold the proximal haptic inferiorly, and gently drop the IOL into the bag (B).

and the proximal haptics are "parked" inside the anterior chamber on the anterior surface of the iris. You then lift the optic with any spatula-like instrument introduced though the sideport incision. Next, using any hook that you may have or a chopper, introduced through the primary incision, fold the proximal haptic downward and gently drop the haptic into the capsular bag.

TIP No. 7. USE A DIOPTRIC POWER GRAPH TO SELECT THE PROPER IOL FOR EXCHANGE

Inevitably, a refractive outcome will occasionally be less than optimal. Even with precise biometry and the meticulous management of astigmatism, a small number of patients require additional attention in order to achieve a desired refractive endpoint. Options include IOL exchange, piggyback IOLs, and keratorefractive procedures. IOL exchanges should be carried out within the first several weeks after the initial surgery, because the polyamide haptics become fibrosed to the capsule after a few weeks, thus making the lens' removal more difficult.

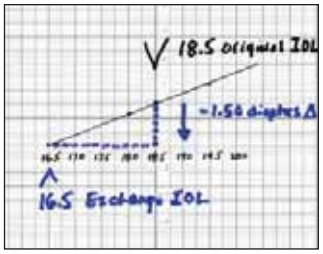

Figure 7. Use a dioptric power graph to select the proper IOL for exchange. Plot the preoperative biometric data by placing the range of dioptric powers on the abscissa and the range of predicted refractive outcomes on the ordinate. Decide the amount of refractive change you desire and select the new IOL power by dropping down the ordinate to correct a myopic error or moving up the ordinate to correct a hyperopic error.

The key to optimizing the refractive outcome is selecting the correct dioptric power for the replacement IOL. Doing so is easy. On a Cartesian graph, using the preoperative biometric data, simply plot the range of dioptric powers close to emmetropia on the abscissa and the range of predicted refractive outcomes on the ordinate (Figure 7). Then, decide the amount of refractive change required. Select the new IOL power by dropping down the ordinate the desired amount for myopic dioptric changes or by moving up the ordinate the desired amount for hyperopic corrections. ■

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