

RESPECTING THE LENS APEX

Accounting for tilt is a must in refractive cataract surgery.



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In addition to being a treatment for lens opacification, cataract surgery has become a refractive intervention. We therefore gladly draw on the lessons learned in corneal refractive surgery. One such lesson is that, in addition to an optical axis, there is an anatomical and pupillary axis. More important is the centering of a refractive treatment over the corneal apex.

As diffractive and refractive lens optics become more advanced, preoperative measurements of the cornea and ocular anatomy help us determine patients' eligibility for these technologies. Increasingly precise diagnostic methods have shown that most crystalline lenses are tilted inside

the eye. One consequence is that the angle between the optic nerve and the macula varies. OCT imaging of the retina and optic nerve indicates that this angle can vary by up to 20°! Tailoring our surgical techniques to account for lens tilt helps us to optimize postoperative visual acuity.

How can we preserve individual lens tilt? We must treat the apex of the crystalline lens as the midpoint for centering the capsulorhexis or capsulotomy because the lens apex is almost always located over the optical axis. When an IOL is implanted in the capsular bag, this lens is centered over the equator of the bag. The capsular bag, however, is not geometrically round. Moreover, the optical diameter of the IOL is 6 rather than 12 mm, so it can easily tilt—especially if the anterior capsule does not provide uniform 360° coverage of the IOL. A frequent result is iatrogenic lens tilt, which deviates from the preoperative tilt of the crystalline lens, not only causing dysphotopsia but also decreasing visual acuity (Figure).

These considerations highlight the importance of correctly centering the capsulorhexis or capsulotomy. Vance Thompson, MD, FACS, uses the Purkinje reflex of his microscope light to center the capsulorhexis and maximize postoperative visual outcomes (see his article on pg 29). Samuel Masket, MD, goes one step further by using a femtosecond laser system to locate the lens apex and center the capsulotomy correctly while guaranteeing an appropriately sized opening for anterior capsular fixation of the IOL (see his article on pg 27). In other words, he can more easily determine the great unknown in biometry—the postoperative effective lens position. Both physicians agree that opening the anterior lens capsule is not only logical but essential to optimizing patients' postoperative visual acuity.

A change in the amount of lens tilt from cataract surgery does not have a major impact when a traditional monofocal IOL is implanted. It will, however, compromise the performance of more advanced IOL designs such as the most recently available bifocal, trifocal, and extended depth of focus IOLs. The take-home message, then, is to respect the lens apex when centering the anterior capsulorhexis or capsulotomy. ■

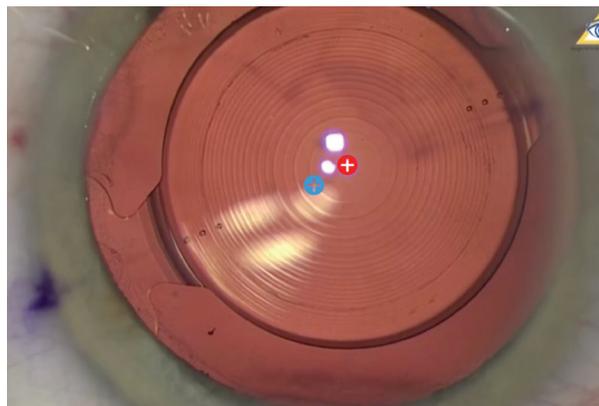


Figure. This toric multifocal IOL is centered on the visual axis but decentered relative to the pupillary axis. The capsulotomy provides 360° coverage of the IOL and is centered over the lens apex (red plus sign). If the capsulotomy were centered over the pupil, it would be decentered, and the patient would look through the second circle of the multifocal IOL (blue plus sign)—a typical reason for postoperative dissatisfaction.