

Visualizing Premium Cataract Surgery

The Lumera has superb optics and is ergonomically comfortable, but the biggest benefit is the new lighting.

BY UDAY DEVGAN, MD, FRCS(GLASG)

Premium cataract surgery encompasses the patient's experience, the refractive nature of the procedure, and the premium lens implanted in his or her eye. Most of all, however, *premium* means performing the highest-quality and safest surgical procedure possible, which requires exquisite visualization throughout phacoemulsification. In premium cataract surgery, every step is crucial. For example, a reproducible and well-constructed incision seals well and induces little astigmatism. A round, continuous capsulorhexis will keep the lens optic centered and stable.

Intraoperatively, subtle visual details alert the ophthalmologist to any potential challenges during surgery. Pseudoexfoliative material on the lens capsule may indicate weak zonules. Adherent lens epithelial cells may contribute to capsular fibrosis and a postoperative shift of the IOL. Tears in Descemet's membrane may reveal a corneal incision prone to leakage. Detecting all of these subtleties while operating requires the excellent visualization provided by the optimized optics and lighting from the surgical microscopes.

THE OPMI LUMERA MICROSCOPE

The first time I used the Opmi Lumera 700 (Carl Zeiss Meditec, Inc., Dublin, CA) microscope, I was hooked. The optics are superb, and the ergonomics are very comfortable. The most striking benefit, though, is the new lighting. Using a combination of paraxial and coaxial lighting, the Lumera gives a beautiful red reflex throughout the surgery. The xenon light source provides the same spectrum of pure white light as natural sunlight. When I perform live surgery at national ophthalmology meetings, I choose the Lumera because I know that visualization will be excellent for me, and the audience will enjoy seeing the fine details of surgery.

Traditional surgical microscopes offer paraxial lighting such that the microscope's light is positioned a few

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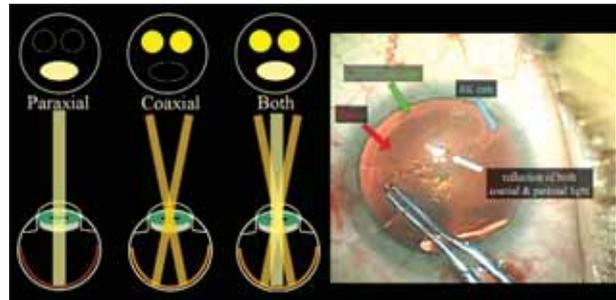


Figure 1. Paraxial lighting is offset by a few degrees from the surgeon's oculars, providing good depth of field but a limited red reflex. Coaxial lighting has a light source aligned with each of the surgeon's oculars, providing a superb red reflex throughout the surgery. Paraxial and coaxial lighting can be combined, as in this case where the capsulorhexis, LASIK flap, and RK cuts are easily seen.

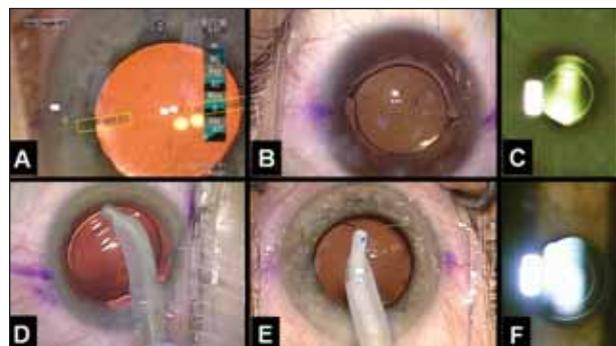


Figure 2. The toric IOL's axial markings are visible with the coaxially lit red reflex and are perfectly aligned with the corneal markings (A). This toric IOL has clear axial markings, but it is not yet aligned with the correct corneal axis (B). This diffractive multifocal IOL is aligned with the center of the pupil (C). The five zones of this refractive multifocal IOL are clearly visible (D). The diffractive zones of this multifocal IOL are visible all the way out to the periphery of the optic (E). After surgery, the IOL is beautifully aligned with the visual axis (F).

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degrees off axis from the oculars. The result is good depth of field, but the red reflex, which is critical in ocular surgery, is limited to a small range. Coaxial lighting involves adding a light source directly in line (a zero-degree offset) from each of the surgeon's oculars. By combining coaxial with paraxial lighting, the surgeon has a continuous red reflex with good depth perception throughout the surgery, even with ocular rotation.

VISUALIZATION

Premium IOLs

Inaccurate position of IOLs, particularly premium designs, can compromise outcomes. The constant red reflex of coaxial illumination provides the view surgeons need.

Toric IOLs must be placed at the steep corneal meridian to effectively neutralize astigmatism. On the optic of the toric IOL, there are markings indicating the meridian of astigmatic correction. With coaxial illumination, surgeons can easily view these markings and align them with similar markings on the cornea.

The multifocal IOLs have concentric rings that must be aligned with the pupil and visual axis to provide optimal vision. Patients having cataract surgery under topical anesthesia can be asked to look between the two coaxial lights, directly in line with the surgeon's view. The IOL can be shifted toward the center of fixation to align the microscope light's reflection and Purkinje images. Using this technique, I find that the multifocal IOLs tend to be very well centered, most within a fraction of a millimeter of ideal. Diffractive lenses often have central optical zones of 1 mm or less, and the proper alignment and centering of these multifocal IOLs is critical for optimal visual results.

Challenging Case

Sometimes, surgeons encounter challenging cases involving patients with complex ocular histories. Visualization of details becomes important. Figure 1 shows creation of the capsulorhexis in an eye that has undergone eight-cut RK and later LASIK. Due to the excellent red reflex from the coaxial lighting, all of these details are clearly visible.

Premium cataract surgery (Figure 2) requires meticulous attention to detail in order to provide a safe and visually rewarding procedure, and that begins with excellent visualization. ■

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