Today’s Surgical Microscopes

New and improved microscopes optimize surgical visualization.

BY DAMIEN F. GOLDBERG, MD; AND JAMES KHODABAKHSH, MD

A Look at the Leica M844

Zone of focus and light settings are customized electronically.

By Damien F. Goldberg, MD

Recent advances in surgical microscopes have made performing cataract surgery easier and safer. The optics and illumination of the new microscopes are nothing short of amazing compared with earlier instruments. My colleagues and I tested both the Opmi Lumera 700 (Carl Zeiss Meditec, Jena, Germany) and the Leica M844 (Leica Microsystems Inc., Bannockburn, Illinois). We found that both microscopes achieve a crisp red reflex at lower levels of light much more easily than previous devices. Creating a capsulorrhexis is now significantly easier regardless of the opacity of the lens and in cases with significant cortical cataracts.

My local hospital bought the Leica M844. Before I even sat down for my first case, the operating staff and I became fans of this instrument’s optics, ergonomics, and size. The footprint is significantly smaller than that of other microscopes, yet the extended net reach makes it easy to position around the operating table. The staff is also able to transport it when needed.

My team immediately loved the focus-lock feature for quick, easy movement in and out of the lateral position and maintenance of the focal plane. With a slight turn of one of the two handles, the microscope glides exactly where it is needed for the surgeon’s focus of the surgical field. The dual-bulb and dual-prism system generates true 3-D illumination using direct illumination (Figures 1 and 2). The homogeneous image created at low levels of light ensures patient safety and fatigue-free viewing for the surgeon.

What really set the Leica M844 apart for me was its touchscreen intuitive control unit. Much like current phaco machines, this microscope’s zone of focus and lighting settings can be customized electronically by the surgeon. This is beneficial in a setting like ours, where more than 25 ophthalmologists share the same microscope.

With the touch of a button on the microscope’s display, my name comes up on the screen. The Leica M844 APO OptiChrome optics choose a low-light setting, and the microscope is set according to my preference as an anterior segment surgeon. With another touch on the display, the microscope can increase the level of lighting and change the focus and the image orientation so my retina counterparts

Figure 1. An anterior capsulorrhesis performed through the Leica M844 surgical microscope.

Figure 2. (A) A retinal peel performed through the Leica M844 and (B) a retinal view.
can maximize their view for a vitrectomy procedure.

I am fortunate to work with a highly trained ophthalmic surgical staff, but providing them with a faster and easier way to set up the microscope has significantly reduced turnaround time and improved our efficiency. The difference is most evident when I am assigned to an operating room with on-call staff for an emergency. When the on-call personnel were only loosely familiar with the surgical equipment, they could take 30 minutes just getting the previous microscope set up properly. They now accomplish the job in 5 minutes.

Another feature of the Leica M844 that I enjoy is that the display can double as a real-time video screen of the surgeon’s view. This built-in screen enables the operating room staff to better anticipate my next move during the case so that they can get the IOL ready or pull additional instruments. This frees the operating room of clutter and an extra video cart.

Once I finish a case, the extended arm reach can be glided out of the way, and the microscope instantly autoresets to my initial settings, thus making it that much easier to begin the next case.

CONCLUSION

The Opmi Lumera and the Leica M844 represent tremendous technological improvements. In my clinic, the latter’s optics, easily set focus, lighting, ergonomics, and focus-lock enhance surgery, improve safety, and maximize efficiency.

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Smoother Workflow With the Opmi Lumera 700

Hands-free operation of the microscope.

By James Khodabakhsh, MD

An optimal view through the surgical microscope is a necessity when performing surgery. After extensive use of many of today’s microscopes, I selected the Opmi Lumera 700 (Carl Zeiss Meditec) for my practice’s surgical suite. My colleagues and I practice in a center that was one of the first in the country to acquire the Lumera. I have now performed more than 400 cataract, refractive, and glaucoma surgeries with the microscope, which I find possesses the finest optics of any that I have used.

The Lumera features adjustable stereo coaxial illumination for dynamic control of the red reflex (Figure 3). This technology sends two beams of light, which are fully coaxial, to the retina before the light reflects back. Light scatters and floods the entire globe, creating distinctive orange illumination resulting in a maximum-contrast view. I see with remarkable clarity ocular tissues, including anterior capsular epithelial cells, every nuance of the cortex, strands of viscoelastic, fine capsular folds or tears, and even the zonular insertion points.

With conventional microscopes, the red reflex appears much darker compared with the highlighted red reflex provided by the Lumera (Figure 4). The microscope’s integrated depth-of-field management system allows further modification of my view. I can choose between maximum depth of field or higher light transmission with the push of a button. The slit illuminator, which provides additional light during the procedure, is integrated into the system. I can adjust the illumination to achieve a highlighted red reflex and improved contrast for unimpeded visualization.

SURGICAL APPLICATIONS

The high-contrast view, image stability, and enhanced depth perception of the Lumera are an asset even in routine cataract surgery. Because fibrillar strands of cortical
material on the posterior capsule can be more easily appreciated. I can polish the capsular bag with greater precision. I am able to locate cortical remnants with less difficulty, which promotes more meticulous procedures. I have also found I need capsular staining less often during surgical procedures.

The Lumera’s unique lighting system has been of particular benefit in complex cases. The capsulorrhexis is generally considered to be one of the most technically difficult steps of cataract surgery. It can be highly difficult to view the red reflex in patients with small pupils, darkly pigmented eyes, dense anterior cortical spoking, and brunescent cataracts. With the Lumera, a clearer view of the anterior capsule and red reflex enables me to complete the capsulorrhexis without difficulty (Figure 4). The stereo coaxial illumination extends this higher-contrast view toward the periphery.

The Lumera has been particularly valuable to me with toric and multifocal lenses. I can more easily locate the alignment bars on toric IOLs, which have sometimes been difficult to see with other microscopes. With multifocal lenses, the Lumera helps me to create a well-centered and pristine capsulorrhexis, which is essential to successful visual outcomes. The aspheric optics of some premium IOLs can tolerate minimal decentration; the high-contrast retroillumination effect of the microscope improves capsular visibility and assists in the completion of the capsulorrhexis. This level of clarity allows me to make faster assessments and facilitates decision making.

The microscope can be equipped with a stereo co-observation tube, allowing a second person to see the surgical field at the same level of magnification as the surgeon. This feature helps sterile assistants and is useful for training purposes. The foot control panel allows accurate control of the microscope, and the buttons can be configured according to my preferences.

**CLINICAL BENEFITS**

In my experience, the Lumera surgical microscope has provided enhanced visualization and a smoother workflow. Superior illumination, higher contrast, and hands-free operation of the microscope have allowed me to focus all of my attention on the task at hand, which promotes better outcomes. The level of detail this instrument provides has made a clinical difference in my practice.

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**TAKE-HOME MESSAGE**

- Both the Leica M844 and the Lumera 700 achieve a crisp red reflex at lower levels of light than previous microscopes.
- The display of the Leica M844 can double as a real-time video screen of the surgeon’s view.
- The depth-of-field management system of the Lumera 700 allows further modification of the surgeon’s view.