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CATARACT/ IOL

High-tech alternative to operating microscopes emerges

by **Matt Young** EyeWorld Contributing Editor



Alternatives to traditional operating microscopes are currently being refined and perfected. Many surgeons might be hesitant to operate by wearing 3-D glasses and looking at a monitor screen because of the perception that they are not looking at the eye during the procedure. The reality is that when looking through a traditional microscope, we are not truly looking at the eye but actually looking straight ahead through the oculars at a virtual image.

Over the last several years, the TruVision 3D Surgical system has improved dramatically, replacing a bulb projection system with high definition monitors and incorporating templates to the apparatus to aid in limbal relaxing incision placement and capsulorhexis formation.

In this month's column, several surgeons familiar with TruVision will give their experiences performing surgery utilizing 3-D glasses and high definition monitors. Perhaps the greatest advantage of this system will be the improved ergonomics of operating without the musculoskeletal limitations inherent in traditional microscopes. For those of us with neck issues, it is a problem that is painfully too familiar.

Richard Hoffman, M.D.,
Column Editor

Surgeons have found the attributes of a new 3-D surgical viewing system surpass those afforded by traditional operating microscopes.

When Robert J. Weinstock, M.D., associate clinical professor of ophthalmology, University of South Florida, Tampa, first saw the video monitor of a new surgical imaging system while walking past a technology display during the 2007 ASCRS ASOA Symposium & Congress in San Diego, he told the vendor it was out of focus.

Then he put on the 3-D glasses that come with the system. "It looked like nothing I had seen before," Dr. Weinstock said. "I realized I could operate on eyes without ever looking through a surgical microscope."

The experience and his subsequent analysis of research on the efficacy of the monitor-based TrueVision intelligent 3D visualization system (TrueVision 3D Surgical, Santa Barbara, Calif.) led Dr. Weinstock to integrate the system into his practice, where he has used it about half of his procedures since 2008.

The TrueVision system, which is registered with the Food and Drug Administration as a class I medical device, has since been used by many other ophthalmologists for refractive, cataract, glaucoma, and retinal procedures. Some surgeons have used it as the visualization system for their lasers system, as well, according

to the manufacturer. The company also is conducting clinical studies of software for the system's use in a Refractive Cataract Toolset, which it expects to release later in 2010.

Steven D. Vold, M.D., former vice chairman and director, Glaucoma Service, Texas A&M College of Medicine, Temple, Texas, has used TrueVision to perform both cataract and glaucoma procedures without an operating microscope for about six months. He described it as somewhat analogous to monitor-based endoscopic surgery, which he has performed for several years.

"However, the TrueVision clearly provides a much greater depth of field than endoscopic modalities during surgery," Dr. Vold said.

Surgical advantages

Dr. Vold has found the imaging technology offers features that surpass those of standard operating microscopes. For example, he praised its ability to use slit lamp digital image overlays on the monitor that can display the surgeon's pre-operative capsulorrhexis and astigmatic markings during surgery.

The system also can display limbal relaxing incision (LRI) marks to guide LRI placement, said Dr. Weinstock. He also is studying his patients' post-op astigmatism results to see if the digital LRI marks improve outcomes.

For Mark Packer, M.D., clinical associate professor of ophthalmology, Casey Eye Institute, Oregon Health & Science University, Portland, Ore., the main advantage offered by the TrueVision system, which he has used for about two years primarily for cataract surgery, is the ergonomic difference from surgical microscopes. The heads-up live video display eliminates the need to hunch over a microscope.

"Because TrueVision frees the surgeon's eyes from the microscope oculars, the positioning of back, neck and head attain increased freedom as well," Dr. Packer said.

Dr. Vold agreed that many surgeons could potentially benefit from the visualization system's ergonomic difference, alone.

"The number of eye surgeons who develop neck and back problems over time while using standard operating microscopes cannot be underestimated," Dr. Vold said.

Patients may benefit, as well, Dr. Weinstock noted, because more comfortable surgeons are likely to get better results and fewer complications.

Another advantage of the monitor-based visualization system is its variety of viewing options, including full or partial screen views that can allow simultaneous external and internal views of the eye.

Dr. Vold found the transition to operating in 3-D "relatively easy and rather enjoyable." He recommended that surgeons testing the visualization system begin using it with routine cataract, corneal or glaucoma surgeries.

"Allow for extra time for each case initially as well," Dr. Vold said. "There is a learning curve, but my guess is that it will be relatively short for most surgeons."



**TrueVision 3D camera on scope
with TrueVision 3D Medical cart
Source: TrueVision**

The transition from surgical microscopes to heads-up displays likely will be easiest for younger surgeons with experience using video games, he noted.

Caveats remain

Even with its many advantages, the new visualization technology is not without shortcomings. Because the TrueVision system is large, it requires its users to have relatively spacious operating rooms. More specifically, as the system requires that the image be taken from the operating microscope, logistically, both the microscope and the TrueVision system need to be present in the operating room—both large footprints. Finally, within the scope of the new software of this system, there is an ability to edit 3-D videos for presentations. However, this functionality requires the presence of 3-D projectors—again significantly contributing to the footprint of the system. Additionally, use of the 3-D glasses requires surgeons to turn off overhead lights.

Dr. Vold has found that the 3-D visualization system slightly exaggerates anterior chamber depth. Additionally, the digital resolution of the image is not as crisp as the direct image through the microscope oculars. However, “the image quality is fully adequate for phacoemulsification; and, in fact, I tend to have better day one post-op uncorrected acuity in eyes I operate on using the system,” Dr. Packer said.

Dr. Packer said surgeons will need to adjust some features to optimize the performance of the visualization system, as with any digital monitor. Also, positioning the screen in the operating room may require some trial and error to get the best view.

As more surgeons push the capabilities of such alternative visualization systems in the future, they may tap the as-yet unexplored potential in demonstrating IOL rotational stability and in better assisting surgeons in glaucoma surgery, according to Dr. Vold. Additionally, the technology may offer expanded use of telemedicine consultation, 3-D measurements of the anterior chamber and improvements in patient education.

The 3-D visualization system has already been well received as an educational tool for medical students and experienced surgeons. “You get a real depth of field and emergence in the screen, almost like you are in the eye,” Dr. Weinstock said.

Editors’ note: Dr. Weinstock has financial interests with TrueVision (Santa Barbara, Calif.). Drs. Vold and Packer are TrueVision consultants, although Dr. Vold purchased the system with his own funds.

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