BRIGHT IDEA Lightweight, polarized glasses offer an easy view into 3D surgical images.

Viking Systems

Is 3D the new HD?

The same technology that helped avatars jump through the screen at the movies is changing the way surgeons operate.

David Bernard | Senior Associate Editor

Remember when high-definition imaging arrived in the surgical suite? While surgeons gushed over the eye-popping view of the surgical site, administrators wondered whether a hefty investment in HD technology would pay off in improved surgical outcomes and greater efficiencies.

You may soon be asking the same question about 3D imaging systems. Like HD, they're making a transition from the consumer entertainment market to the surgical arena. And as with HD, while the benefits may be hard to quantify in terms of clinical outcomes, the "gee-whiz" factor they seem to be generating among physicians is undeniable.

When surgeons are introduced to 3D imaging, "their first response usually is, 'No thanks, I can do my surgery fine, I don't need this.' Then it's, 'Holy cow! Now I know what you're talking about,'" says Martin A. Martino, MD, FACOG, director of robotics and minimally invasive surgery in gynecologic oncology at the Lehigh Valley Health Network in Allentown, Pa.

3D laparoscopy a 'game-changer'

Some 3D visualization systems incorporate a re-engineered laparoscope. The shaft is the same size, 10mm to 12mm in diameter to fit through standard trocars, but with 2 separate lens-and-HD-camera systems capturing identical images at an angle approximating that of human eyes' binocular vision. Other systems attach a camera to the oculars of a surgical microscope to replicate the scope's stereoscopic view of the ENT, spinal, neurological or plastic surgery the physician is performing on a high-definition video monitor at the surgical site or on the OR wall.

Earlier versions of 3D video technology required you to wear cumbersome helmets or head-mounted displays to see the display monitor in full effect. This not only risked obstructing surgery, but also limited the number of people in the OR who could see the

3D, since purchasing enough viewers for every participant could prove prohibitive. Now, however, a light pair of glasses similar to polarized sunglasses integrates the monitor's 2 flat images into a single 3D image. Plus, the glasses are inexpensive enough to order extras for everyone.

"3D laparoscopy is likely going to be a game-changer," says Gerald Andriole, MD, the Robert Killian Royce Distinguished Professor of Surgery and chief of the division of urologic surgery at the Washington University of St. Louis (Mo.) School of Medicine. For a laparoscopic trainee, the visual immersion it offers may shorten the learning curve for tying knots, applying clips and other tasks, something he and his peers are currently preparing a wet lab course to study. "We live in a 3D world, and it can prove difficult to make the conversion to 2D," he says. "This offers an advantage."

For the experienced laparoscopist, 3D is a boost of confidence. "We're more inclined to take on complex cases now," says Dr. Andriole. Take laparoscopic radical prostatectomies, for example. "Many are now done with the assistance of a surgical robot. But with 3D visualization, I have every advantage that the robot might offer, plus I have tactile feedback."

PERCEPTION AND REALITY 3D lets everyone in the OR see what the surgeon is seeing.

TrueVision 3D Surgical

Benefits the entire surgical team

A real-time, 3D feed from a surgical microscope can let physicians operate in an ergonomically friendlier heads-up posture, looking at the monitor, as opposed to stooping to the scope's oculars for long stretches. But Robert Owens, MD, an otolaryngologist at the Owens Ear Center in Dallas, points out that it aids the surgical staff even more.

"3D lets everybody who's part of the surgical team see exactly what I'm seeing under the microscope," he says. From the assistant who'd normally have to settle for a 2D view through the scope's teaching head to the nurses and techs who need to anticipate the surgeon's next moves and instrument needs, depth perception has a huge impact on observation. "It ultimately leads to increased efficiency and decreased surgical times," he says.

The display monitors in use over the surgical field, whether they're mounted on the arms of equipment booms, suspended from the ceiling or built into video carts or towers, should probably be on the small side, 19 to 25 inches (measured diagonally in the landscape position). That size is easy to position and easy to see at their close working distance, says Dr. Andriole. "The monitors will be at a distance of 3 to 4 feet from your head," he says. "A much bigger one, that would be counterproductive." Larger screens in the surgical field "just take up valuable space," adds Dr. Martino, and may present the risk of equipment collisions.

The screen you're considering mounting on the OR wall, across the room and on the other side of the patient, however, can be as large as you want it. "You can put a 42- to 50-inch screen on the walls, maybe even a 60-inch, since more people are going to be looking at it," says Dr. Martino. Keep in mind, though, that a large monitor may require the room to be dimmed for optimal image quality.

Screen size aside, the quality of the image is of paramount importance. "How does it look, that's where the rubber meets the road," says Dr. Martino. Your image will appear in sharp HD no matter what size the screen is as long as each component in the imaging system — the imaging source, the video cabling or wireless signal routing device, and the monitor or other destination — transmits and reproduces HD signals at the same resolution. The image won't be displayed at its full potential if, for example, a 1080p endoscopic camera sends its signals to a standard definition monitor (which only displays

FIELD OF VIEW The location of a display monitor from the surgical field should influence the size of its screen.

480 lines of pixels) or even a 720p monitor (1,280 by 720 pixels, progressively scanned).

To confirm that each link in the imaging chain shares the same resolution format, seek out definite technical specifications (such as "1080p" or "1,920 x 1,080 progressive") and avoid frequently misused or misinterpreted marketing phrases (such as "full HD" or "true HD").

The phrase "medical grade" may also appear in monitors' marketing materials and may also be misunderstood by potential buyers. In video displays, "medical grade" refers only to the fact that a display has met the safety requirements for operation in a surgical field, says Nathan Pinkney, a senior project engineer for the ECRI Institute, a Plymouth Meeting, Pa.-based non-profit healthcare research organization. "It does not indicate that the display features a higher image quality," he adds. While monitors in the surgical field must be medical grade, monitors elsewhere in the OR need not be. This can expand the pool of vendors from whom (and price points at which) you can buy that big screen your surgeons are asking to mount on the wall. **OSM**

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