



OSN Technology and Equipment Workshop presentation: TrueVision 3-D imaging system

The following excerpt is from a presentation by John A. Hovanesian, MD, at the 2009 OSN Technology and Equipment Workshop on the [TrueVision 3-D imaging system](#).



**John A.
Hovanesian**

John A. Hovanesian, MD: We're going to switch gears a little bit now to not so much what comes up through the oculars of the microscope, but what the microscope outputs. The next frontier in microscope surgery is the view that the surgeon actually gets, not just how it's lighted but what we see. I am a consultant to a number of different companies, but I have no financial interest in the topic of this presentation.

When we consider technology what we use in microscopes and surgery, the old paradigm from the '50s of using lubes to remove cataracts seems like a far away thing that dates from the time when Ozzie and Harriet were on TV and when we had our first electric can opener, which is a pretty neat idea, and when a milkman still came to your house. But in fact, this has been outmoded, and over time we have evolved to the use of microscopes. And we have some really fantastic technologies that have obtained very good images of the eye.

But there is a downside to this as well. And it leads us to ask the question: Why do we do it this way with the microscope, leaning up to look into it, and is there a better way? When you are asking a question about existing technology and how it should be better, I always ask this question: WWCKD, or in other words, what would Captain Kirk do? He would probably say, "Put it on screen." In fact that's exactly what's happening now with microscopes and what we'll talk about today: a true vision system that allows surgeons in stereo and in high definition to see a 3-D image of what we're operating on without looking directly through the oculars of the scope. That's a very simple concept. We replace the eyepieces of the microscope. And this can be used with a Leica or a Zeiss or any sort of microscope that adapts to a very standard fitting.

It is a fairly basic system: the camera, the microscope, which most of us already have, and the console which displays it. We now have LCD monitors that actually project in 3-D and allow us surgeons to watch in 3-D. This was one of the great rages from this year's Consumer Electronics Show in Las Vegas. So, this system will become even more sort of compact with that technology. But with a projector system, which is sort of the state of the art now, this is what the apparatus is that you have in the OR, a projector and a microscope.

The surgeon has essentially hooked up to his microscope system. The surgeon can step away and sitting up straight can look at the screen through 3-D glasses.

This immediately brings to mind a couple of different benefits. We can certainly move

ourselves up close and work on our posture to be positioned right. But very often, being fixed to a microscope is a very physically constraining thing and really adds to the energy we expend in surgery. With this sort of a system, one does not need to do that. You can sit up straight in a very normal posture and operate on the eye while looking at a screen.

Now, the resolution of the screen, as I mentioned, is in HD. It's like a 1080 progressive scan display through a projector. But for some cases where higher contrast is desired — perhaps low contrast eyes, dense cataracts, doing capsulorrhexis — some surgeons wish to look through the oculars in the microscope and that can be done. It's as simple as leaning forward to look through them, and having the microscope attached to a side port. So, there is no reconfiguring to get that view if a surgeon wants it.

The second benefit of this kind of system is teaching. In the old paradigm with a single 2-D projection system, everyone in the room could see what was happening if it was projected or put on a screen, but not in stereo. Now, with this new system, all the people watching surgery in the room have the opportunity to see exactly as the surgeon does.

The implications for training staff and training surgeons are very clear. This has also been used by industry and product demonstrations. We're now seeing continued growth of this medium because it really changes the way we view surgery. And now, at all of the major meetings, we're seeing courses being taught in 3-D high definition.

Also, conferences for referring doctors, practices who have this technology in their offices are showcasing it to their referring doctors as a new and better way to do surgery. They are using them for patient seminars showing how high-tech the practices are. And this is really what they've used to set themselves apart as doing something greater. So, there are those benefits.

The third benefit, and one of the most exciting, is intelligent imaging. Neurosurgery has really embraced this 3-D imaging technology for their surgery where they can combine, with MRI images in the upper right corner and pictures taken clinically, to determine where pathology is. And that's certainly possible, because the image is processed from the camera into a computer system and then can be output. So, for us in ophthalmology the implications are many. One can take a picture of the eye before surgery in an upright position and with whatever lighting we desire to image the size of the pupil. And then the computer system can then match that using iris registration technology to the patient's eye. And we can determine at the time of surgery in real time, with real-time tracking on the display, where the undilated pupil is and what size it is. And this certainly has implications for placement of multifocal and toric lenses. In the case of toric lenses or in the case of limbal relaxing incisions, again we can obtain a rotational analysis of where that axis and how many arcs there should be, where they should be. And so, this will match up according to a preoperative slit lamp image where we want that astigmatism placement to be. Certainly it adds a dimension of precision that is not available with sampling marking at the 3 o'clock and 9 o'clock positions with a marking pen.

So, besides our brethren in other specialties, ophthalmologists are now taking advantage of this technology. And I think that we will see, as time goes on, better visualization, better ergonomics and better teaching through a system similar to the TrueVision 3-D imaging system.

The OSN Technology and Equipment Workshop is a showcase of the clinical benefits of new surgical and diagnostic equipment, surgical instruments, software, vision testing and contrast sensitivity testing systems. Step beyond the brochures, bring the products in the exhibit hall to life, and hear surgeons' clinical impressions of the newest equipment and instrumentation. This workshop will allow attendees to interact with surgeon users and manufacturers.