Fundus Viewing and Video Recording During Vitrectomy

Recent advances in technology have made it possible to make high-quality video recordings.

BY KAZUAKI KADONOSONO, MD, PHD

The choice of operating microscope is an important factor in obtaining good visualization of the fundus during vitrectomy. Wide-view operating microscopes are now popular among vitrectomy surgeons, and several models are available. In our clinic at the Yokohama City University Medical Center, I typically use the Resight (Lumera 700, Zeiss) operating microscope, which has a reduction lens that moves in proportion to the pressure exerted by the surgeon on the foot switch to focus on the object. Most operating microscopes for ophthalmic surgery have an inner focusing system but no outer focusing system that enables the microscope itself to be moved up and down. The Resight, however, has both inner and outer focusing systems to facilitate visualization of the fundus. This article presents a case in which surgery was performed using the Resight operating microscope and details how to obtain high-quality videos during vitrectomy.

CASE REPORT

A 67-year-old man who had undergone cataract surgery 7 years previously experienced sudden vision loss a few days before coming to our clinic. The examination showed that the patient's intraocular lens (IOL) was dislocated posteriorly on the fundus. Figures 1 and 2 show the dislocated IOL moving up toward the surgeon as perfluorocaobon liquid is injected. The Resight wide-angle viewing operating microscope provided clear visualization of the peripheral retina and the IOL simultaneously. It is possible that the IOL struck the peripheral retina while the perfluorocaobon liquid was being injected. The surgery was successful, and the

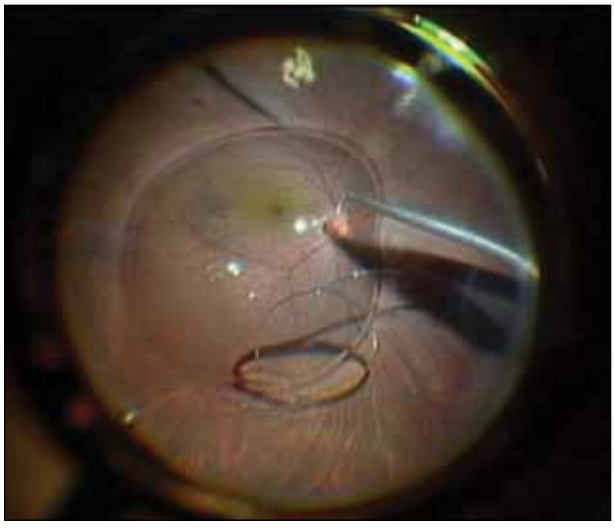

Figure 1. In this case of a posteriorly dislocated IOL, the IOL and the posterior retina are clearly visualized through the Resight operating microscope.

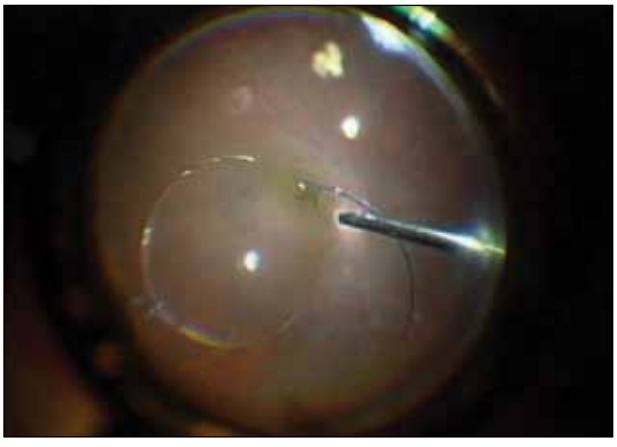

Figure 2. In the same case, the IOL can be seen clearly, but the posterior retina is obscure.

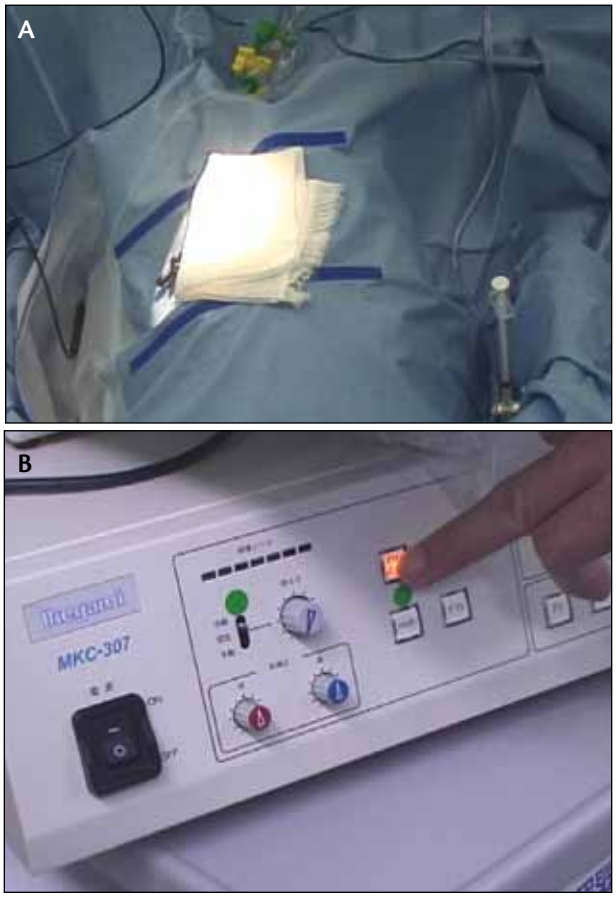

Figure 3. Checking the white balance is the first step (A and B) in creating high-quality recordings.

patient's postoperative best-corrected visual acuity was 20/20.

BENEFITS OF RECORDING

Video recordings of surgical procedures are valuable tools for vitreoretinal surgeons. These recordings can be helpful in explaining treatments to patients and are also useful in conducting research and making presentations. Sometimes a video recording can also serve as documentation of a medical problem. Recordings can provide the most accurate, up-to-date information regarding an operation and provide valuable material for medical education. Recent advances in audio-video technology have made it possible to take high-quality video recordings.

Figure 4. Good control of the auto-iris level is important.

OBTAINING HIGH-QUALITY VIDEOS

The quality of the images recorded during vitrectomy depends mostly on the brightness of the illumination. The quality of images of the fundus during vitrectomy is poorer than the quality of images of the anterior segment because it is more difficult to illuminate the posterior segment than the anterior segment. The degree of brightness during vitrectomy is governed by the level of illumination—whether an IOL is present, whether a

Figure 5. Changing the adjustment of exposure mode on the camera deck makes the image clearer.

In order to obtain high-quality videos using a beam splitter during vitrectomy, the vitreous cavity must be made brighter by using chandelier illumination with a xenon light source.

contact or noncontact lens system operating microscope is used, and whether a beam-splitter is used—and by the quality of specifications of the video camera.

During vitrectomy, xenon light sources are more useful than halogen light sources. Video images are clearer when viewing the fundus using a vitrectomy contact lens than when viewing the fundus through an operating microscope with a noncontact lens; 90% of the light is transmitted into the vitreous cavity when a contact lens is used, as opposed to only 70% when a noncontact lens is used. Images are also brighter in aphakic eyes than in phakic eyes or eyes containing an IOL.

In order to obtain high-quality videos using a beam splitter during vitrectomy, the vitreous cavity must be made brighter by using chandelier illumination with a xenon light source, as only 25% of the light is passed to the surgeon and 75% is sent to the camera by the beam splitter. The other option is to control the auto-iris level, which regulates the exposure and sensitivity of images. Once the white balance on the auto-iris is set at its lowest level and the iris of the camera is opened widely, the image becomes much brighter because the baseline exposure level is lower (Figures 3 and 4).

Adjusting the video camera deck data is another way to increase brightness. The camera's adjustment of exposure mode also plays an important role in achieving clear images of the fundus (Figure 5).

SUMMARY

High-definition video recording has recently been gaining popularity. These techniques and devices may be useful for vitreoretinal surgeons for obtaining good-quality videos during vitrectomy. ■

Kazuaki Kadonosono, MD, PhD, is a Professor and Chairman of the Department of Ophthalmology, Yokohama City University Medical Center in Japan. Dr. Kadonosono states that he has no financial relationships to disclose. He can be reached via email at kado@med.yokohama-cu.ac.jp.