Surgical Tips for the Beginning Vitreoretinal Fellow:
How to Get the Best View during Surgery

AN INTERVIEW WITH ANDRE J. WITKIN, MD; JOSEPH MAGUIRE MD; AND SUNIR J. GARG, MD
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Across the country, fellows are taking up the challenging and rewarding pathway to learning vitreoretinal surgery. One of the challenges commonly encountered by fellows during vitreoretinal surgical training is optimally visualizing the retina during surgical manipulation, especially when using wide-angle viewing systems. As obtaining good visualization is a fundamental step in performing safe and effective surgery, we have asked advice from expert vitreoretinal surgical instructors on how they teach trainees to get the best view during surgery. Of note, wide-angle viewing systems can be divided into contact and noncontact systems, such as the BIOM (Binocular Indirect Ophthalmoscope, Oculus) and Resight (Carl Zeiss), and this article focuses on noncontact systems in addition to binocular indirect ophthalmoscopy in the OR.

— Francis Char DeCroos, MD; Adam Gerstenblith, MD; and Rajiv Shah, MD

“How do you set up the BIOM and eye to ensure you obtain the optimal view?”

Andre J. Witkin, MD: Before starting the case, the patient’s head should be properly secured so that the cornea is relatively parallel to the floor. This can mean adjusting the head or even the whole bed. The microscope should always be zeroed at the beginning of each case. After starting the case, don’t forget about addressing the anterior segment first. Make sure corneal clarity is optimized. Clear out the anterior chamber if there is blood or inflammatory debris. Make sure the pupil is adequately dilated for safe surgery (although the BIOM does not require the pupil to be extremely dilated). If there is a dense cataract obscuring the view, consider addressing it. After the anterior segment is optimized, the BIOM should be properly focused. This means adjusting the BIOM focus under high magnification initially and then zooming out to a comfortable magnification. This allows more room for surgical maneuvering without having to adjust the focus in the middle of the case.

Joseph Maguire, MD: First, you want to ensure the condensing lens and aperture lens are matched. In ORs where there are multiple rooms set up for vitrectomy and multiple BIOMs, there may be variation in the stem length. If the lenses are inadvertently placed in the alternate BIOM setup, the lens mismatch can make it impossible to obtain a clear focus.

In properly setting up the BIOM, first center the scope with the reset button. Second with the light pipe in place, lower the BIOM to the point where the pupil fills up the condensing lens; if you then check the condensing lens position over the eye, the distance between the cornea and lens is optimal.

Sunir Garg, MD: Before draping a patient, I make sure the head is in a neutral position. However, if he or she has deep set eyes or a prominent nasal bridge, I’ll turn the head 15° away from the eye being operated on. Once draped, I’ll confirm that the head is where I want it to be. I then make sure that the scope is centered before bringing it into position. When using the BIOM, I’ll make sure that the focusing screw is dialed down approximately 75% of the way toward the condensing (bottom) lens. With other viewing systems, this is not generally an issue.
As I lower the noncontact viewing system, I’ll lift the microscope a centimeter, otherwise the condensing lens tends to hit the cornea, spreading gonioscopic solution all over it. I then lower the microscope to bring the condensing lens as close to the eye as possible. I’ll then place the lens so it is centered over the cornea.

**THE BIOM CAN PROVIDE A FIELD OF VIEW UP TO 120° AND A DYNAMIC VIEW OF 135°. HOW DO YOU OBTAIN THE BEST PERIPHERAL VIEW WITH THE BIOM?**

**Dr. Witkin:** Zoom out. Make sure the BIOM is close enough to the eye but not so close that it induces parallax. The tendency is to move the eye to see peripherally, but often a better view can be obtained by keeping the eye centered and pivoting instruments around the canula openings (“oar-locking”).

**Dr. Maguire:** The best peripheral viewing with the BIOM is all about keeping the eye in a neutral position as long as possible. This reduces prism and by extension, aberration. As you move out to the periphery, and rotation of the eye becomes necessary, make sure your microscope x-y axis follows your instruments. At some point illumination of the peripheral retina will become difficult, and lighting can be enhanced by slightly pronating your hand. Pronating will make your thumb move more vertical and extend your field of illumination more peripherally. As you do this, slightly withdraw your light. Withdrawing the light source will have the effect of enlarging the area of illuminated field. Finally, always advance your instruments toward the pathology without ocular rotation until absolutely necessary.

**Dr. Garg:** To me, it’s a bunch of small things together. To achieve a wide field, one has to come as close to the eye as possible. The next step is to keep the eye in a neutral position (so that the iris plane is parallel to the floor). If you start with the eye off axis, it becomes harder to take advantage of the wide field as the case goes on. The easiest way to visualize the retinal periphery is with a skilled assistant who can help with scleral depression. Often, an assistant who can depress is a luxury that many retina surgeons do not have.

If you are working alone, you can get out in the periphery by tilting the eye slightly toward the part of the eye you are trying to see well and drive the joystick of the microscope in the same direction. For example, when I want to see to the right, I’ll tilt the eye to the right a little bit and drive the joystick to the right. When I want to look inferiorly, I will drive the eye back to the neutral position (to the left in this case) then drive the eye inferiorly. (Over time, you can skip the going back to neutral step, but it helps early on.) When I’m doing vitrectomy, both of my feet make small movements all the time. As an analogy, a few years back I drove across the Great Plains on my way to Yellowstone. The highway was beautiful—straight and smooth. But I still found myself making these really small adjustments to the steering wheel to keep the car pointed in the right direction. If you can make the joystick and the eye move in concert, you’ll stay in view usually past the posterior vitreous base insertion.

**HOW DO YOU OPTIMIZE YOUR VIEW DURING SCLERAL DEPRESSION IN CONJUNCTION WITH THE BIOM?**

**Dr. Witkin:** Again, the tendency is to move the eye, but the best view is often obtained by keeping the eye straight and using the depressor to push the retina into view. It takes time to gauge the amount of scleral depression necessary to obtain a good view; it usually takes much less force than is initially intuitive. Make sure the light source is perpendicular to the retina being depressed.

**Dr. Maguire:** As helpful as passive wideangle viewing is during vitreoretinal surgery, eventually scleral depression is required to visualize and manipulate the retinal periphery. I will lower the infusion pressure to 15 mm Hg from the typical setting of 20 to 25 mm of Hg to soften the eye and allow more facile indentation. Also, always maximize your illumination. With a phakic individual, make sure the light pipe is not extended underneath the lens. In fact, the closer your light is to the trocar, the wider your field of view will be.

**Dr. Garg:** Keeping the eye neutral and close to the cornea helps a lot. Otherwise, I agree with my colleagues.

**HOW DO YOU SET UP THE MACULAR CONTACT LENS AND LIGHT PIPE TO ENSURE THE BEST VIEW FOR MACULAR WORK?**

**Dr. Witkin:** To focus the macular lens, it is often useful to first adjust the microscope under low magnification, and then use the fine focus after switching to higher magnification. Higher magnification allows better visualization of the macular details, however, it is crucial to remain even more cognizant of the position of your instruments. Moving the light closer to the macula allows better visualization of membrane details, but it is important to operate expeditiously to avoid the possibility of light toxicity.

**Dr. Maguire:** Many contact lenses that do not require suturing tend to glide on the surface of the cornea and go where gravity sends them. In my patient positioning before draping, I rotate the head toward the nonsurgical eye; this helps the lens remain centered by making the eye more vertical and limiting lens slippage during the
case. Placement of goniosol directly in the cup of the lens also reduces skating of the lens. In terms of lighting, you want the light pipe close enough to avoid glare and to maximize depth of focus. Finally, tilting of the lens creates prism and aberration, so avoid this.

**Dr. Garg:** I will also make small movements of the light to see where the membrane is most visible. I think of this like using the slit lamp to see cells in the anterior chamber. I move the slit beam around until I can best see the anterior chamber. The same principle holds true with the light pipe, but obviously the light pipe is a cone and not a slit. However, the cone of light gives me different properties depending upon how near or far I am from the retina, as well as with the angle of illumination. This takes time to appreciate.

**HOW DO YOU ADDRESS LENS CONDENSATION IN A PSEUDOPHAKE WITH A POSTERIOR CAPSULAR OPENING DURING AIR FILL?**

**Dr. Witkin:** There are several methods that can be used. First, if you are using a soft-tip extrusion needle, you can gently brush the condensation away with the instrument (like a windshield wiper). Unfortunately, the condensation reappears quickly, so this is only useful if a brief maneuver is needed. Alternatively, viscoelastic may be used to coat the back of the lens. Dispersive viscoelastics, such as Viscoat (Alcon Laboratories, Inc.) work the best for me, as they stick to the intraocular lens more readily. Finally, the infusion line may be redirected toward the lens, so the air “blowdries” the back of the lens. For this to work, one of the other cannulas may have to be open to allow air to flow through the eye.

**Dr. Maguire:** Typically, I'll do 1 of 2 techniques. If the case is nearly complete, I'll do a “windshield wiper” technique with the silastic tip of my extrusion needle and direction the infusion away from the lens, quickly finishing before condensation reappears. Alternatively, I will use a cohesive viscoelastic to coat the rear surface of the intraocular lens.

**Dr. Garg:** As we use valved cannulas more often, the way we use the strategies highlighted above may change. The soft tip cannula is often tough to get into the eye with a valve in place, so removing the valve or changing to a hard tip extrusion may help. With Dr. Witkin’s blowdrying technique, one of the valved ports will have to be kept open with a vented cannula, and a chandelier light may have to be used, as only 1 port would then be available.

**HOW DO YOU OBTAIN AN ADEQUATE VIEW FOR SUPERIOR ENDOLASER?**

**Dr. Witkin:** Superior surgical maneuvers can be frustrating when sitting at the head of the bed. In preopera-
tive planning, the surgeon may consider sitting on the temporal side of the patient if he/she knows that sitting superiorly will be an issue. Otherwise, place cannulas as close to the horizontal meridian as possible, or even place one or both cannulas inferior to the horizontal meridian. Other options are to move the infusion to the superotemporal port and use the inferotemporal port for the surgical instrument, or to use a fourth trocar to create a new inferior entry site to allow easier access to the superior retina.

Dr. Maguire: Here again, setup is always very important. I try to place my active trocars near the 3 and 9 o’clock positions. This way, I have freer range of movement and better access to 6 o’clock and 12 o’clock retina. In other circumstances, such as peripheral capsular opacification, I have no problem switching my infusion from the inferotemporal trocar to one of the superior trocars and directing my laser probe through the inferotemporal trocar to the superior retina. Again, scleral depression and lowering the infusion pressure during indentation can be significantly helpful in challenging situations such as smaller pupils or capsular opacification.

Dr. Garg: A curved, illuminated laser probe used with the principles mentioned earlier, make laser pretty straightforward and fun!

HOW DO YOU OPTIMIZE YOUR VIEW DURING PRIMARY SCLERAL BUCKLING?

Dr. Witkin: Make sure there is adequate light. Patient positioning is important, just like in scleral depression in the clinic. Have your assistant hold the muscles or rotate the eye to allow more comfortable visualization. Take your time to make sure you’ve looked at the entire retina. Making detailed clinic drawings prior to surgery can be very useful.

Dr. Maguire: Careful 360º depression is imperative to identify all holes and breaks. It is counterintuitive, but an anesthetized patient is more difficult to sclera depress; although there is no concern about comfort, you—as the surgeon—are doing the work to move the eye. Once you have identified the pathology, it can be difficult to efficiently place the cryoprobe while stabilizing the eye. There are a couple of things you can do to help. First, have your assistant grab two sutures and rotate the eye 90-180º so the area to be treated is closest to the lateral or medial canthus. This stabilizes the eye but also creates more room for cryoprobe access. If there is no assistant, use your cryo probe as a fulcrum to rotate the eye while retracting the suture 180º away with the hand holding your lens. Also, if there is a small tear that is difficult to see, you may lose the position when switching from a scleral depressor to the cryoprobe. In this situation, leave the cotton swab in place, and then
place the cryoprobe in the exact location of the cotton swab. Once I place the probe, I nudge the cotton swab out of the way and proceed.

**Dr. Garg:** A dim bulb (whether on the indirect ophthalmoscope or in the surgeon’s head) is never good, so maximize illumination. I like the old-fashioned indirect ophthalmoscopes such as the Keeler Fison (Keeler). It’s made of metal and is fairly indestructible (this I’ve witnessed firsthand). Corneal hydration is important, and gonioscopic solution is as helpful here as it is during vitrectomy. I like the O’Connor sclera depressor (Storz, Bausch + Lomb) to mark the breaks. This depressor has a nice 3-mm teardrop on one end and a 1.5-mm Gass scleral marker on the other end. It’s really fabulous.

**ANY TIPS ON OBTAINING A BETTER VIEW DURING LIO IN THE OR?**

**Dr. Witkin:** See my previous answer. Because patients can’t move their eyes, it is helpful to use a cotton-tipped swab to simultaneously move the eye and perform scleral depression.

**Dr. Garg:** Doing this on a sleeping patient is a lot harder than one might imagine. A cotton tip works well, but often the eye that you lasered looks more bloody than the eye that had the vitrectomy! I often use a large paper clip that has the ridges on it. It works well for me and is sterilizable and cheap.

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