

Fundus Visualization With Wide-angle Viewing Systems

These devices allow surgeons to recognize fundus pathology and treat lesions safely and effectively.

BY MASAHITO OHJI, MD

In this issue of Retina Today, Masahito Ohji, MD, provides an overview of wide-angle fundus viewing systems.

We extend an invitation to readers to submit pearls for publication in Retina Today. Please send submissions for consideration to Ingrid U. Scott, MD, MPH (iscott@psu.edu); or Dean Elliott, MD (deliott@doheny.org). We look forward to hearing from you.



—Ingrid U. Scott, MD, MPH; and Dean Elliott, MD

Vitreotomy is unique because surgeons cannot see the surgical field—the fundus—without the aid of devices or instruments. It is imperative that surgeons are able to view the fundus to perform precise vitrectomy procedures. Several devices and instruments are available for fundus viewing, including floating lenses and wide-angle viewing systems. This article discusses some of the wide-angle viewing systems.

Preferences and Trends (PAT) surveys^{1,2} conducted by the American Society of Retina Specialists reveal that most vitreoretinal surgeons currently use a wide-angle viewing system. These systems provide a wider field of view compared with floating lenses, allowing surgeons to recognize peripheral fundus pathology better and to treat lesions more safely and efficiently. Having a wider field of view of the fundus has become increasingly important with 23- and 25-gauge microincision vitrectomy surgery (MIVS) because it is difficult to rotate the patient's globe and indent the sclera during vitrectomy. Additionally, wide-angle viewing systems provide a relatively good view of the fundus in eyes with small pupils or mild corneal opacity. Furthermore, surgeons do not have to change the lens during fluid-air exchange.

There are several kinds of wide-angle viewing systems, and they are typically broadly classified as contact-lens and noncontact systems. Each system has advantages and disadvantages, as described below.

BIOM

Manfred Spitznas, MD, first described the Binocular Indirect Ophthalmic Microscope (BIOM; Oculus, Wetzlar, Germany), one of the original wide-angle viewing systems, in 1987.³ The BIOM incorporates the principle of indirect ophthalmoscopy into the operating microscope. According to PAT surveys, this is the most commonly used wide-angle viewing system among vitreoretinal surgeons.^{1,2} Initially, the BIOM required manual focus adjustment and an image inverter. This technology has evolved; the latest version of the BIOM system, BIOM IV, includes an automatic inverter and focus adjustment with a footswitch.

OFFISS

The Optical Fiber Free Intravitreal Surgery System (OFFISS; Topcon Medical Systems, Oakland, NJ), developed in 2003 by Masayuki Horiguchi, MD,⁴ is a wide-angle viewing system for the OMS-800 Operation Microscope (Topcon Medical). The technology is similar to the BIOM system. The lens has a large diameter, which allows fundus viewing to the ora serrata. With OFFISS, surgeons can adjust the focus using the microscope's footswitch.

A unique feature of the OFFISS system is that the illumination is incorporated into the microscope. Surgeons can see the fundus without using a light pipe. Therefore, this technology allows surgeons to perform a bimanual technique with regular instruments.



Figure 1. Rotating bar (arrow) and lens holder (asterisk).

PWL

The Peyman-Wessels-Landers 132 D Upright Vitrectomy Lens (PWL; Ocular Instruments, Bellevue, WA) provides wide-field, upright images without an inverter because of an internal prismatic system.⁵ It is less expensive than other noncontact systems. The focus can be adjusted with the footswitch.

One possible disadvantage of this system is that it may be difficult to maintain an appropriate x-y-z position with tilting when the device is attached to the wrist rest or to the microscope with the standard clamp, straight rods, and linkage system. Recently, we developed a holding system for the PWL lens to overcome this potential disadvantage.⁶ The lens holder consists of three parts: the holding device, the rotating bar, and the lens holder. The holding device is fixed to the microscope and holds the rotating bar. The lens holder is fixed with a screw to the window at the lower part of the rotating bar.

When the surgeon sets up the new holding system, the lens holder can be easily and precisely held at the center of the light axis (Figure 1). Surgeons obtain a wide-field image of the fundus through the PWL lens held with the lens holder. It is easy to remove the lens temporarily when performing a procedure in the anterior segment without the fundus viewing system and to move it back to the center of the optical axis to see the fundus. Another advantage of the system is that surgeons can see the sclerotomy or 23- or 25-gauge cannula directly under the microscope by rotating the lens holder a little off the center of the optical axis (Figure 2).

RESIGHT 700

The Resight 700 (Carl Zeiss Meditec AG, Jena, Germany) is the wide-angle viewing system incorporated into the Lumera 700 microscope (Carl Zeiss Meditec). This technology can hold two lenses, a 127.00 D lens for wide-angle viewing and a 60.00 D lens for magnifying images of the



Figure 2. The cannula can be viewed under the microscope by rotating the lens holder a little off center of the optical axis.

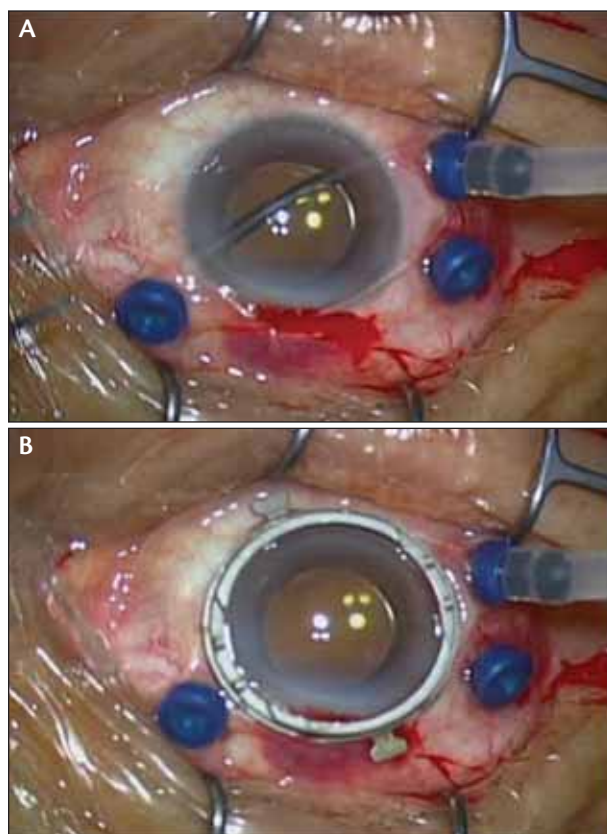


Figure 3. Silicone band between two cannulas (A). The lens ring is held with the silicone band (B).

posterior pole. These lenses provide clear fundus images with minimal distortion. The fundus image is automatically inverted by Resight's Invertertube E. Users can also adjust the focus with the footswitch of the microscope through an internal focusing system.

The wide-angle viewing systems are useful and, in my opinion, essential for MIVS. However, lower magnification

makes it difficult to perform precise procedures in the macular area, such as internal limiting membrane removal. The Resight 700 has a magnifying lens as one of its two lens options, which is useful for this maneuver.

CONTACT-LENS SYSTEM

Yasuo Tano, MD, developed a sutureless ring system to hold a contact lens on the cornea by yoking it to the ocular speculum; this device is especially useful for MIVS.⁷ Shunji Kusaka, MD, recently developed a new sutureless ring system for MIVS.⁸ The silicone ring, strung between two cannulas, holds the metal ring of the contact lens in place (Figure 3). The silicone band is easy to take on and off. For surgical cases, we prepare several sets of magnifying contact lenses, silicone bands, and the lens rings in an autoclavable box. In most cases, I use a combination of this set and the PWL system.

CONCLUSION

Surgeons can choose a wide-angle viewing system according to their preferences. Ultimately, wide-angle viewing systems are essential for vitrectomy, particularly for MIVS. ■

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