ENDOSCOPY: AN OVERLOOKED TOOL IN THE MANAGEMENT OF OCULAR TRAUMA

Despite a steep learning curve, this instrument can make a big difference.

BY MARCUS COLYER, MD

Intraocular foreign bodies (IOFBs) can be found in as many as 40% of penetrating or open globe injuries.[1] Penetrating eye injuries can cause permanent loss of vision, corneal ulcers, infection, and sympathetic ophthalmia; however, timely and proper management can result in favorable anatomic outcomes with restoration of good visual function in most cases.

Although endoscopy has not been a popular approach among retina surgeons, its use has slowly increased in the past decade. In particular, the technology may have a place in the management of ocular trauma. Several case reports and small studies have demonstrated its efficacy, especially in indications pertaining to penetrating injuries,[2-6] perforating injuries of the globe,[6] and IOFBs.[3,6] Delayed action, particularly in the event of ocular trauma, can lead to significantly worsening conditions for these patients. The use of the endoscope enables more rapid intervention with less resulting trauma to the eye.

PERSONAL EXPERIENCE

Endoscopy allowed me to perform surgeries on military service members with ocular trauma who would otherwise have required lengthy procedures in attempts to rehabilitate their eyes. The eyes of these patients were injured by improvised explosive devices, grenades, rocket-propelled grenades, or shrapnel. Primary repair of these injuries took place in Iraq and Afghanistan. The patients were then evacuated to the United States within 3 or 4 days. Their extensive injuries involved complex anterior and posterior segment disease, corneal injury with retinal injury, vitreous hemorrhage, and limited views through opacified corneas. Without endoscopy, my ability to perform definitive retinal surgical repair would have been severely limited.

FACILITATING DIAGNOSIS AND TREATMENT

Due to the severe trauma in these eyes and the resulting visualization issues, it is necessary to use anterior chamber structures to assist in correct orientation. The endoscope allows the viewer to, in effect, bypass anterior segment opacities, and it enhances visualization of anterior structures in the posterior segment such as the ciliary body, the pars plana, the posterior iris surface, and the peripheral retina (Figure 1). These anterior views are not available through the operating microscope, and this unique perspective is particularly useful when there is significant damage to the cornea associated with retinal detachment or severe posterior segment injury (Figures 2 and 3). The intraocular views possible with endoscopy can aid in diagnosis in eyes with severe trauma when visualization is diminished, and they can help prevent further complications.

Identification of retinal breaks and safe and effective repair of

AT A GLANCE

- Endoscopy is an excellent option for optimal visualization in ocular trauma cases, especially if infection, inflammation, or encapsulation have already occurred.
- The endoscope allows the viewer to bypass anterior segment opacities and enhances visualization of anterior structures.
- Endoscopy facilitates faster treatment times, eliminates delays that could cause further issues, and aids in critical and time-sensitive procedures in severely traumatic eyes.

Figure 1. Endoscopic view through pars plana of ciliary processes and zonular apparatus. This view is important to master in order to assess postsurgical anterior loop proliferative vitreoretinopathy and hypotony in traumatized eyes.

retinal detachments can be facilitated with the endoscope.[7-9] Endoscopy-assisted vitrectomy has also been effective in the treatment of sequelae of open globe injuries.[10] Early detection and intervention is also critical with regard to IOFBs,[11,12] which can cause posttraumatic endophthalmitis. Delay in treatment increases the risks of infection and encapsulation, which exacerbate injury. Endoscopy is an excellent option for optimal visualization in these cases, especially if infection, inflammation, or encapsulation has already occurred. Complications such as retinal tears may occur if IOFBs are removed without adequate visualization.[13] Endoscopy can aid with removal and often prevent devastating outcomes.

IMPORTANCE OF ILLUMINATION

Achieving correct illumination with endoscopy can be challenging. Endoscopy lighting is coaxial, meaning both the light and the camera are oriented in the same direction. Due to the presence of vitreous opacities—typically vitreous hemorrhage—illuminating an eye with severe trauma is analogous to driving a car through fog. Light from the headlights projects onto the fog, making it more difficult to see through. In a similar way, light from the endoscope can project onto the vitreous and vitreous hemorrhage; therefore, the endoscopic illumination must be varied in order to visualize the vitreous, retina, and other structures. In contrast, the view in a normal vitrectomy is more of a bird's eye approach, with illumination entering from the side. Learning how to adjust light intensity and how to use chandeliers and multiple lighting mechanisms can take some time.

Trying to illuminate injuries in a traumatized eye while performing endoscopy can also be disorienting. The eye cannot be viewed as it is typically viewed through a microscope. However, with endoscopy, it is possible to turn off the main light port and illuminate from a different direction or to use a second light pipe to gain orientation inside the eye. Using a chandelier as a separate light source can be helpful, as it stays illuminated and offers hands-free illumination.

CONCLUSION

The greatest challenge with the use of endoscopy is its somewhat daunting learning curve. The use of the instrument is difficult for a beginner, even when working in normal anatomy. Performing a standard vitrectomy on an eye with an attached retina and normal, viewable landmarks is complex enough, but when the central core of the eye is filled with blood and there is a retinal detachment, it is exceedingly

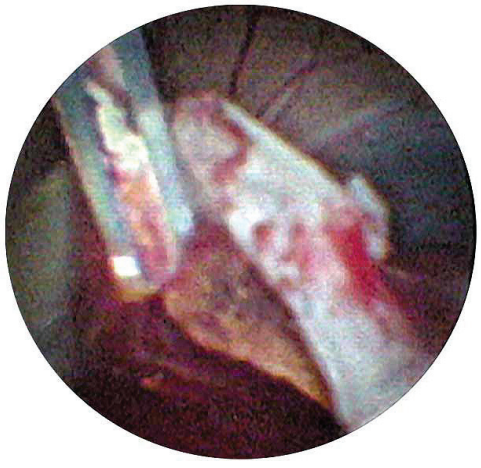

Figure 2. Endoscopic image of metallic IOFB with hemorrhage and retinal detachment.

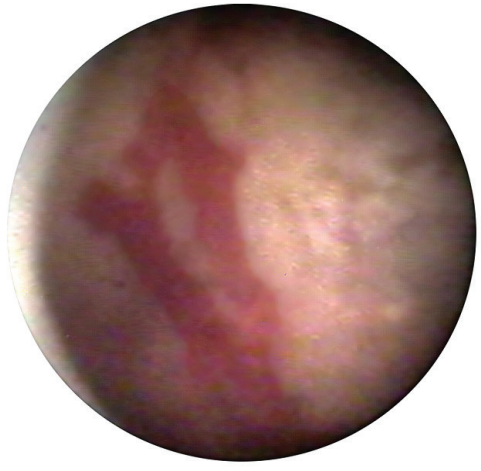

Figure 3. Endoscopic view of large subretinal hemorrhage in the retinal midperiphery.

ENDOSCOPY PEARLS

- **Find reliable landmarks**, such as anterior structures or the optic nerve, **in order to get your bearings**. Start with the recognized structure and work your way out from there, reducing illumination to the minimum amount necessary to visualize intraocular structures. This will help cut through the fog of reflected light and allow better visualization.
- **Use an endoscope as often as possible in normal nontraumatic cases to gain comfort and experience** with the instrument. This way, when surgery in a traumatized eye is necessary, visualization and correct orientation will come more easily.

difficult to know exactly how to perform endoscopy. The learning curve involves a great deal of reorientation.

Learning curve aside, the use of endoscopy is becoming more widespread with the availability of new instruments. This greater availability also provides opportunities to become comfortable with the use of the endoscope. The more one uses an endoscope, the more confident one becomes, and confidence is beneficial to both patients and surgeons.

From a practice standpoint, endoscopy is reimbursable, so billing is easy. Use of the procedure eliminates delays in treatment times that could cause additional issues in traumatized eyes, and it facilitates critical and time-sensitive procedures in these severely damaged eyes. ■

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