The Future of Microincisional Cataract Surgery

A new technology lessens the risk of thermal injury while maximizing chamber stability.

BY DONALD N. SERAFANO, MD

Although microincisional cataract surgery has been a hot topic at recent medical meetings, associated surgical concerns may preclude the widespread acceptance of this emergent technique. Lower flow rates and removal of the infusion sleeve can lead to thermal injury, increased mechanical stress at the incision site, and poorer next-day results compared with standard phacoemulsification. For these reasons, many surgeons have not made the transition to microincisional cataract surgery. This article discusses how the Aqualase Liquefaction Device (Alcon Laboratories, Inc., Fort Worth, TX) may affect surgeons' decisions about performing microincisional cataract surgery.

CONCERNS WITH MICROINCISIONAL CATARACT SURGERY

One of my greatest concerns with microincisional cataract surgery relates to fluidics. The smaller incision necessitates the use of smaller-diameter irrigating choppers, which provide less infusion flow. Although improvements in the design of irrigating choppers attempt to address this limitation, even the best fall short of providing the same amount of irrigation flow as an infusion sleeve. In order to avoid significant chamber instability, the surgeon must employ lower aspiration flow rates and lower vacuum levels. Unfortunately, reducing the levels of these critical parameters compromises the holding force and results in more manipulation of lenticular material, greater mechanical stress to the incision, and extended surgical times. A longer procedure also requires additional irrigating solution, which increases the potential risk of corneal edema.

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Also of concern is the risk of thermal injury at the incision site. The lower aspiration flow rates used with microincisional cataract surgery provide less cooling of the tip, and the removal of the coaxial infusion sleeve takes away an additional layer of protection. Although duty-cycle modulation can reduce the risk for thermal injury, its potential still exists. Many surgeons therefore increase the incision size to allow more leakage, but this corrective measure compromises the stability of the anterior chamber and negatively impacts surgical control.

AQUALASE AND MICROINCISIONAL CATARACT SURGERY

Advances in technology that address microincisional cataract surgery may increase surgeons' acceptance of the procedure. The Aqualase Liquefaction Device offers the promise of circumventing various limitations of microincisional cataract surgery by providing a novel, nonmechanical way to remove lenticular material while maintaining both safe temperatures at the incision site and chamber stability.

The Aqualase Liquefaction Device is offered on the Infiniti Vision System (Alcon Laboratories, Inc.). Unlike the

vibrating tip used with ultrasound-based phacoemulsification, the Aqualase handpiece generates 4-µL pulses of surgical solution that remove lenticular material without mechanical motion via a process called *liquefaction*. These warmed pulses of solution are propelled and released within a smooth, capsule-friendly, polymer tip with a rounded bevel. Because the pulsing action is centralized within the tip itself, no mechanical energy is transferred to the incision, thereby reducing the potential for trauma. The absence of tip movement also facilitates creating a watertight incision, which results in a truly closed system that improves chamber stability.

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Although Aqualase may be used for 3+ nuclei, the technology is more appropriate for softer lenses. Surgeons will have a small learning curve before becoming comfortable using the technology. I find that employing high vacuum, which occludes the tip, enables me to use the Aqualase pulses more effectively. In addition to Aqualase, the Infiniti Vision System offers a lower-compliance design and the ability to monitor both irrigation pressure and aspiration vacuum. These features allow me to safely perform cataract surgery at a higher vacuum level than is achievable with other systems.

CONCLUSION

The use of the Aqualase Liquefaction Device can be beneficial to both conventional and microincisional cataract surgery. Coupled with the advanced fluidics of the Infiniti Vision System, Aqualase minimizes thermal injury and maintains chamber stability. As more surgeons embrace technology that offers these benefits, they may become more accepting of microincisional cataract surgery for clear lens extraction and other refractive lens procedures. ■

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