How to Perform Biaxial in 2008

The division of irrigation and aspiration provides more favorable patient outcomes.

BY GILLES LESIEUR, MD

Today, innovations and technology rule the organization of our surgical practices. Peyton's training circle (Figure 1) reminds us that with every change we make comes a consequence—the transition from unconscious abilities to unconscious incompetence. With that in mind, why should we update our surgical habits, which require training, a learning curve, and investment in time and materials? Herein lies my answer as to why I switched to microincision cataract surgery (MICS) and my described technique of choice.

After the work of Hiroshi Tsuneoka, MD, of Toyko, and Amar Agarwal, MS, FRCS, FRCOphth, of India, in the 1990s and Jorge L. Alió, MD, PhD, of Spain, in 2000, I was interested in lbiaxial MICS (B-MICS).[1] Certainly, the prospect of creating a 1.2-mm microincision seemed the main motivator; however, I also quickly realized that the division of irrigation and aspiration

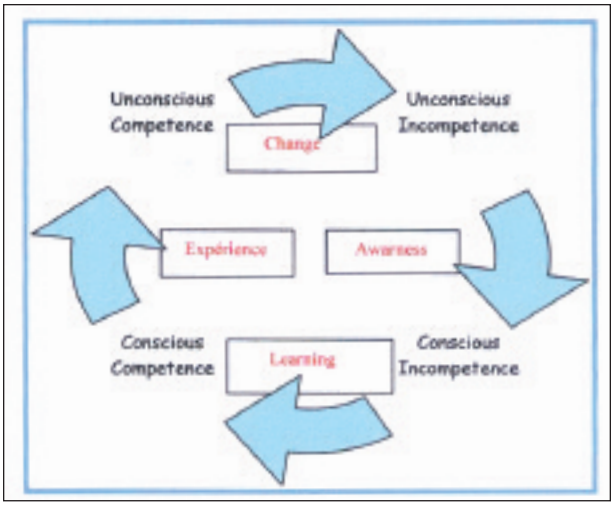

Figure 1. Peyton's circle is depicted.

was more favorable in terms of safety and visual recovery. B-MICS is more accurate, less traumatizing, and permits safe phacoemulsification in difficult cases, including patients with a narrow anterior chamber, myosis, or intraoperative floppy iris syndrome.

STATISTICS

I complete 100% of my operations with B-MICS and have had good results. Other ophthalmologists, however, do not seem as convinced of its benefits. Only 5.2% and 18.2% of US and European surgeons, respectively, use B-MICS. Among the US surgeons, 25% use it as their exclusive cataract surgical technique, and 33% of the European surgeons use it in at least half of their cases (personal communication with Leaming; 2006-2007). In my country, only 2.32% of surgeons practice B-MICS.[2]

In an analysis of available MICS platforms installed in Europe, the most popular were the Infiniti Vision System and Ozil (Alcon Laboratories, Inc., Fort Worth, Texas), the Stellaris (Bausch & Lomb, Rochester, New York), and the WhiteStar Signature (Advanced Medical Optics, Inc., Santa Ana, California) (personal communication with Leaming; 2005).

B-MICS is slowly gaining approval, and 45.3% of European surgeons who do not currently practice biaxial are interested in the procedure. Approximately 30% of those European surgeons who do not currently prac-

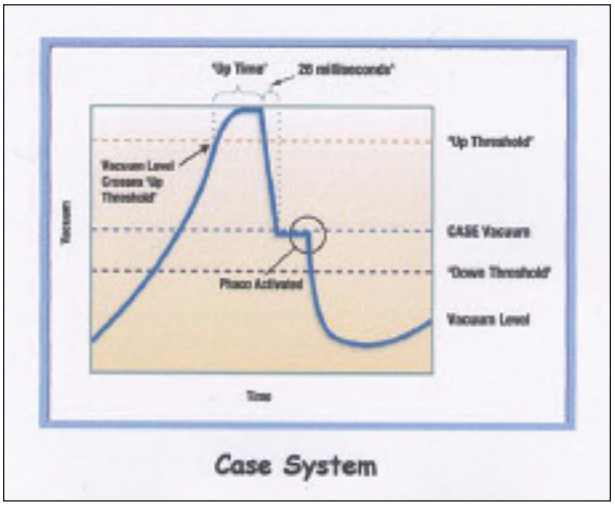

Figure 2. The chamber stabilization environment (CASE) is available on the WhiteStar ICE system.

Figure 3. The perfusion tubing increases flow from 120 cc/minute to 167 cc/minute.

tice biaxial hope to begin in the near future; 50% favor the Sovereign phaco system (personal communication with Leaming; 2005).

This may suggest that even if surgeons are not using B-MICS, it may be due to access to the technology rather than not agreeing with the concept. Several companies are reacting to this statistic, and research and development departments are working to increase their company's MICS product lines.

For example, in 2005, Alcon Laboratories, Inc. launched its microcoaxial technique, which permits surgeons to perform MICS without significant modifying their technique. Additionally, Alcon designed the Ozil handpiece for torsional phacoemulsification, and Advanced Medical Optics, Inc. updated its system with WhiteStar Signature software that uses more occlusion and less ultrasound. The company has now launhed the Signature phaco system. New implants and injection systems for mini-incision (between 2 and 2.8 mm) or microincision (sub—2-mm) surgery have also been designed.

AVOIDING COMPLICATIONS

Step 1: Incision
Two incisions, 1 mm square, are separated by 90°.

Step 2: Capsulorrhexis
A viscoadaptive ophthalmic viscoelastic device (more cohesive than dispersive) is used. Squeeze the handle of the foreceps to control the capsulorrhexis.

Step 3: Hydrodissection
Complete a perfect dissection before performing phaco chop.

Step 4: Phaco chop
With an efficient and nontraumatic hydrochopper, introduce the phaco tip. I prefer a bevel-down Dewey tip (MicroSurgical Technology, Redmond, Washington), I then turn it bevel up for the final introduction. Adapt the phaco system settings and phaco chop to the hardness of the core.

For a hard nucleus, I use quick chop, stop and chop for a soft nucleus. The phaco tip is a 20-gauge 30° tip; ultrasound power is 15/10%; vacuum 500/260 mmHg; aspiration rate 20cc; perfusion height 105 cm.

Step 5: Irrigation/Aspiration
Do not hesitate to change your hand for 360°cleaning of the capsular bag.

Step 6: Loading the IOL
Use counterpressure and avoid too much pressure in cases of capsular zonular weakness (eg, high myopia, pseudoexfoliative syndrome).

Step 7: Bimanual
Completely extract the OVD with bimanual I/A.

Step 8: Hydratation
Hydrate the incision for a perfect and secure incision wound.

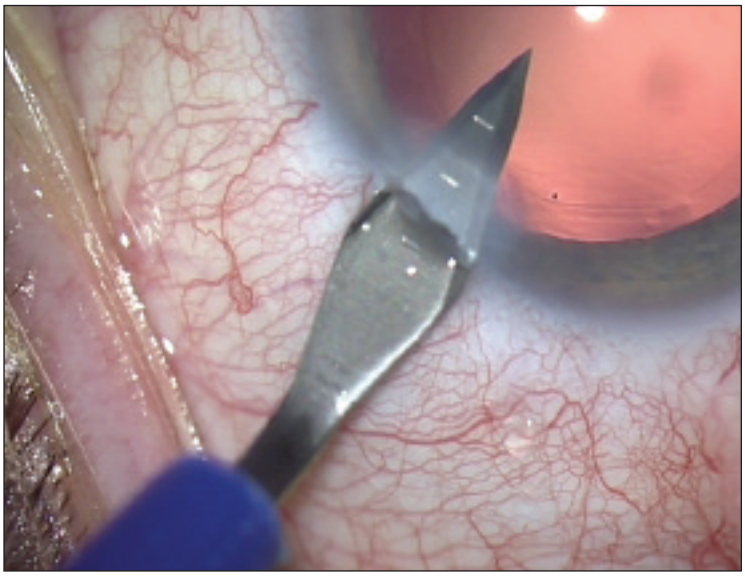

Figure 4. Dr. Lesieur designed the MicroCut, a knife adapted for MICS as well as mini-incision surgery. It creates a 1.2- to 2.4-mm incision.

MY TECHNIQUE

I have found that the learning curve for B-MICS is short because surgeons are already used to working with both hands. Most surgeons will find that their procedure time does not increase, and in fact, it should be a similar length to most coaxial procedures.[3] In my hands, a typical B-MICS case proceeds as follows: I use the Sovereign WhiteStar Increased Control and Efficiency (ICE) system, which includes its signature chamber stabilization environment (CASE; Figure 2). This environment allows a vacuum level, which is defined in advance (ie, up threshold), that reacts within the first 26 milliseconds before the infusion break. The system can then return to the down threshold, avoiding surge. The CASE perfusion line is 15 cm longer than the previous perfusion kit, which permits the use of high vacuum and allows a 40% higher flow rate at the same perfusion level. Surge is also avoided with this kit. The perfusion tube (Figure 3), constructed of PVC, is 5-mm, lightweight tubing that increases flow from 120 cc/minute to 167 cc/minute. This modification of the perfusion line, in association with the WhiteStar ICE technology, permits a very high vacuum (500 mm Hg) without surge.

I can also increase the total power of the pulse from 0% to 12% within the first millisecond of the procedure using the WhiteStar's Kick System.

One important tool for any cataract procedure is the surgical knife. In conjunction with PhysIOL (Liége, Belgium), I developed the MicroCut (Figure 4), a knife adapted for micro- and mini-incision surgery that creates 1.2-, 1.8-, 2.2-, and 2.4-mm incisions. Another important tool, the hydrochopper, allows flow balance and an accurate phaco chop and avoids capsular trauma. Hydrochopper tubing with a slim lining, such as 20-gauge tubing, creates a flow rate of approximately 45 cc per minute.

Unfortunately, most hydrochoppers exceed the tube's diameter, and a capsular break is probable if the chopper comes in contact with the capsule. Therefore, I have designed two hydrochoppers with a 0.4-mm (Lesieur Horizontal Hydrochopper; Katena Products, Inc., Denville, New Jersey) or 0.8-mm tip (Lesieur Vertical Hydrochopper; Katena Products, Inc.). Both choppers show the coaxial opening and allow a safe

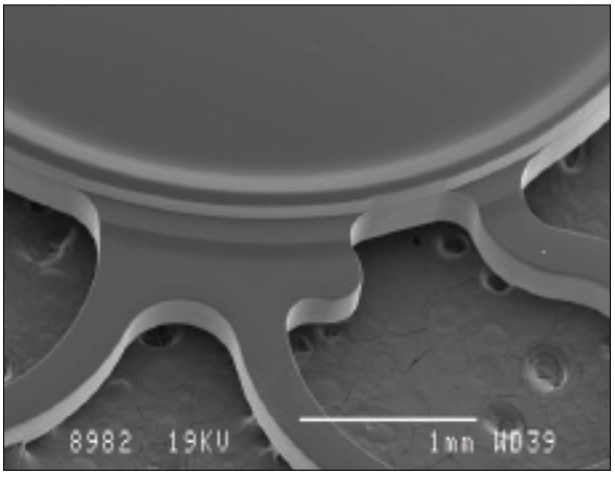

Figure 5. The MicroSlim IOL.

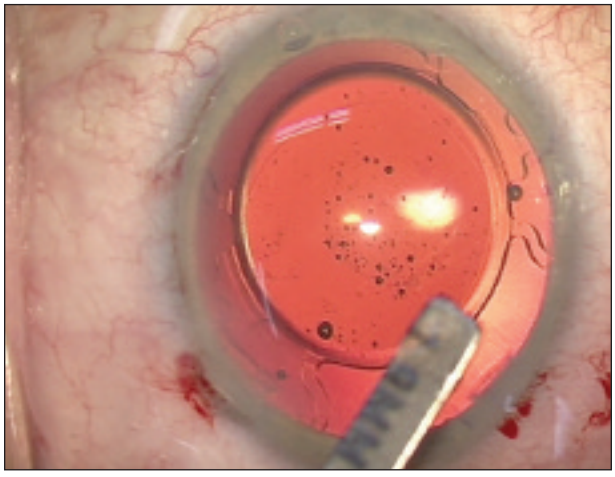

Figure 6. The final incision size for the MicroSlim is 1.8 or 1.9 mm.

TAKE-HOME MESSAGE

- One benefit of B-MICS is the division of irrigation and aspiration.
- A total of 18.2% of European surgeons use B-MICS. The percentage is even lower in the United States (5.2%).
- The learning curve associated with B-MICS is short for those surgeons who already practice bimanual.

chop of the core. The bevel permits a good insertion into the anterior chamber, and two lateral openings were designed to avoid surge during chopping when the coaxial opening is closed. I choose to use these hydrochoppers during my B-MICS procedures.

My IOL of choice is the MicroSlim (PhysIOL; Figure 5), which is a 25% hydrophilic acrylic design that is more compressible than the company's SlimFlex design. This modern IOL design has a 6.15-mm optic, a 360° square-edge design, and a 5° posterior angulation.[7-9] It fits through a 1.8- to 1.9-mm incision (Figure 6), regardless of IOL power. Additionally, a Medicel 1.8-mm injector (Medicel AG, Luchten, Switzerland) may be used to perform a 1.6-mm incision, which is then enlarged to 1.8 mm to 1.9 mm. Minicoaxial phaco may alternatively be performed through a 2.2-mm incision.

Separation of irrigation and aspiration is essential to provide the best efficiency, less repulsion of nuclear fragments, and reduction of the effective ultrasound time.

The following are some of my pearls for B-MICS: Separation of irrigation and aspiration is essential to provide the best efficiency, less repulsion of nuclear fragments, and reduction of the effective ultrasound time.[4] Surgical complications are the exception but easily managed when they occur because you can advance to fragment removal when capsular break occurs. My steps to avoid complications during the learning curve of MICS are outlined in *Avoiding Complications*.

When using the Sovereign WhiteStar system, phaco handpieces remain the same for both C- or B-MICS; however, if the Infiniti with Ozil is used, the handpiece must be switched.

CONCLUSION

There is no doubt that the evolution of MICS permits a less invasive and traumatic surgery. By employing less ultrasound and creating narrower incisions, biaxial phacoemulsification is a more secure and accurate procedure compared with C-MICS. It has opened the way for other emergent technologies, including minicoaxial phaco and the Ozil handpiece. Complications become the exception and are easily managed with B-MICS. In my hands, and with B-MICS, my patients achieve excellent results and are happy with faster visual recovery. ■

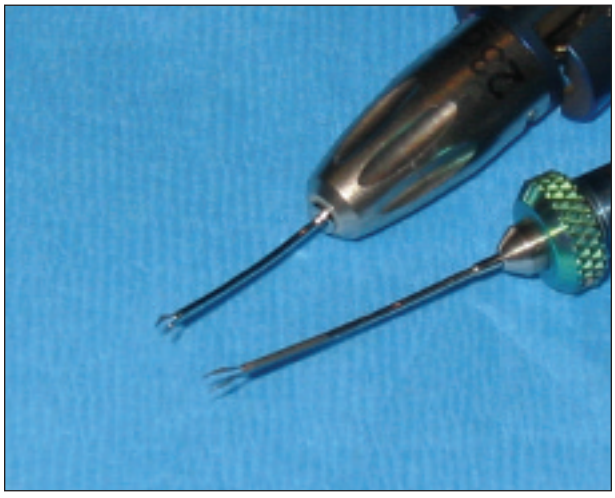

Figure 7. The microforceps Dr. Lesieur uses.

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