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Dedicated Instrumentation for MICS

Microincisional cataract surgery demands a fastidious surgical technique executed with instruments designed for precision.

BY LOUIS "SKIP" D. NICHAMIN, MD

This fourth article in this series of cataract instrumentation and devices reviews the instruments Dr. Nichamin has designed with Baush + Lomb/Storz Ophthalmic Instruments for use in microincisional cataract surgery (MICS). Like Dr. Nichamin, I also preach the merits of meticulous wound construction for optimizing visual outcomes, and meticulous microincisions (and the surgical maneuvers performed through them) require the use of specialized instruments.

—Robert H. Osher, MD

I have always held an interest in designing and refining some of the hand instruments we use for cataract surgery. The microincisional cataract surgery (MICS) procedure that ophthalmologists are increasingly embracing has provided an opportunity to further refine our instruments. The challenge is to design properly sized knives with which to create perfectly formed microincisions.

CORNEAL MICROINCISIONS

With the help of Bausch + Lomb/Storz Ophthalmic Instruments (Rochester, NY), I designed dedicated diamond blades for corneal microincisions (E0130; Figure 1A). I prefer diamond blades for all my incisions, although there are high-quality steel keratomes available. I chose a trapezoidal diamond keratome that measures 1.7 mm at the leading width and 1.9 mm at the trailing width in order to make a watertight microincision. A watertight corneal incision enhances the fluidics of MICS and permits the insertion of the Akreos MI-60 microincisional lens (Bausch + Lomb) via a wound-assisted injection technique. After IOL insertion, this size of microincision, made with a dedicated diamond keratome, self-seals quite readily. In some cases, I hydrate my microincisions to ensure that they are extremely secure and quick to seal, although generally, they do not require it.

Similarly, I like to use a dedicated diamond blade to make the sideport incision for my nondominant hand. I keep the sideport incision as small as possible (600 to 700 µm or 0.60 to 0.70 mm), because it can leak much more than many surgeons appreciate.

MICROCAPSULORHEXIS FORCEPS

The capsulorhexis is where surgeons who are transitioning to MICS may have a minor learning curve, because the traditional forceps used to complete the capsulorhexis are too large for incisions smaller than 2 mm. One option is to use a cystotome, as many surgeons did years ago before the advent of phacoemulsification. Alternatively, smaller-caliber forceps are available. I designed what I feel is a facile microcapsulorhexis forceps (E2013; Figure 1B). This instrument resembles a microvitreoretinal membrane forceps and its use may require a short learning curve. Once surgeons are comfortable with this microcapsulorhexis forceps, they may prefer the greater sensitivity, even if they use larger incisions periodically.

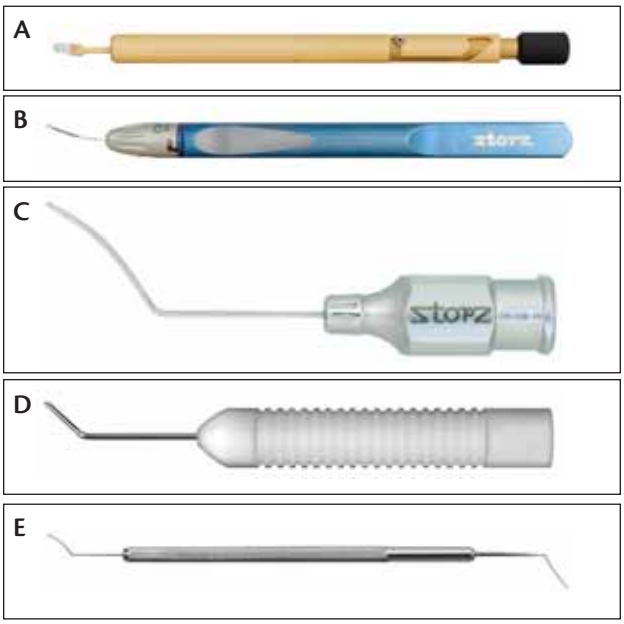

Figure 1. The trapezoidal diamond keratome (A), the MICS Capsulorhexis Forceps (B), the Nichamin Hydrodissection Cannula (C), the Nichamin Side Port Cannula (D), and the Nichamin Double Ended Nucleus Chopper-Spatula (E).

HYDRODISSECTION CANNULA

The Nichamin Hydrodissection Cannula (E4421 H and E4421 H27; Figure 1C) is specifically designed to facilitate

the cortical cleaving hydrodissection technique developed by I. Howard Fine, MD. The cannula is arched to enable the surgeon to easily place its flat tip directly beneath the surface of the anterior capsule in order to perform cortical cleaving hydrodissection, which greatly enhances the efficiency of the hydrodissection maneuver. As Dr. Fine has described, there is often very little cortex left in the capsular bag at the completion of phacoemulsification, and this greatly reduces irrigation/aspiration time and effort.

SIDEPORT CANNULA AND CHOPPERS

The microincisional Side Port Cannula (E4421 S and E4421 S21; Figure 1D) in my MICS series has a small, angled tip that promotes access to the sideport incision. If surgeons make the main incision temporally, then the sideport incision is either at the 6- or 12-o'clock position, which can be difficult to access in deep-set eyes. The Nichamin Side Port Cannula fits the incision nicely and is designed to prevent torque during surgery. This close fit greatly assists stromal hydration and self-sealing of the incision. The instrument is specifically designed for bimanual procedures such as anterior vitrectomy.

I also designed a chopping instrument that I have used for many years. The Nichamin Double Ended Nucleus Chopper-Spatula offers two options for surgeons: one end has a double-ended chopper designed for use with a horizontal phaco chop technique, and the opposite end has a traditional cyclodialysis spatula that surgeons may use on soft cataracts or to remove the epinucleus (E0570 N; Figure 1E).

The Nichamin Vertical Chopper is the instrument I have been using almost continuously for the past 5 to 10 years, since I transitioned from a horizontal to a vertical chopping technique. It is a superb instrument that I use in 95% of my phaco procedures.

When inserted through the sideport incision, both of these choppers fit the incision to reduce unwanted leakage during the phaco procedure that can lead to destabilization of the anterior chamber. Narrow manipulators may cause balanced salt solution to leak during manipulation and phacoemulsification.

LID SPECULUM

I designed a lid speculum for contemporary phaco surgery that is available in either a spring or a locking style. I tend to use the locking device for phacoemulsification, because it permits greater exposure, particularly when I use limbal relaxing incisions (LRIs). Both styles are designed to enhance temporal access to the limbus. This speculum wraps around and down over the lateral canthus, and its blades fit underneath the eyelids to enhance patient comfort, which is important under topical anesthesia.

INSTRUMENTS FOR ASTIGMATIC LIMBAL RELAXING INCISIONS

The technique of creating astigmatic LRIs has interested me for decades, and I use several instruments that I find significantly enhance the procedure. First, it is very important to place good orientation marks on the cornea while the patient is in an upright position. I use a finely inked instrument to make several radial marks on the limbus, which I feel is more accurate than just placing a single ink mark with a marking pen.

A similar marking instrument made by Storz can be used to mark the cornea when the patient is lying supine under the microscope. For this approach, I mark the desired meridian over which the LRI is centered.

The company also makes a wonderful degree gauge that helps the surgeon identify the desired meridian over which to center the incisions. The surgeon places the gauge over the orientation marks to quickly and accurately determine where to locate the incisions. Also, I use a fixation ring to help maneuver the eye into an optimal position to perform an LRI. If the eye is not in a good position, it can be challenging for the surgeon to bring the LRI blade in at a perpendicular orientation. Again, he or she may use the lid speculum to gain better exposure and then nudge the eye into a maximal position for perpendicular access to the limbus. Thus, the fixation ring allows the surgeon to efficiently create a more effective LRI.

Finally, Storz has an excellent-quality diamond LRI blade (Storz E0123) that the surgeon may either set at an empiric depth of 600 µm, or (my preferred technique) adjust the blade's depth based on ultrasound, pachymetry, and thickness readings over the intended limbal location. By measuring the corneal thickness in the region where I plan to place the LRI and then adjusting the blade accordingly, I gain enhanced accuracy. I believe the perception that LRIs are unpredictable and can regress is entirely related to issues with the technique and instrumentation. Too many surgeons use older, poor-quality knives that do not cut consistently and result in poor outcomes. A high-quality diamond knife specifically designed for LRIs produces results that are quite impressive. Anecdotally, very few of my patients require further enhancements. The Storz LRI knife has an exquisite diamond blade, and the associated footplate is specifically designed to enhance visualization of the limbus and to optimize the creation of the incision. ■

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