Advantages of Coaxial Microphaco

This technique can provide continuously stable anterior chamber conditions.

BY MAGDA RAU, MD

Bimanual microincision phacoemulsification was developed in an effort to reduce incision size and decrease induced astigmatism during cataract surgery. Despite its proposed advantages, bimanual microincision phaco has not fulfilled all its expectations, and surgeons continue to look for alternatives that allow smaller incisions and optimal outcomes. Several years ago, Robert H. Osher, MD, of Cincinnati, Ohio, described coaxial microphaco (CMP). This article reviews the procedure and provides a checklist of parameters for performing it successfully.

PROCEDURE

The surgeon can choose between two sizes (2.2 or 2.4 mm) of clear corneal incision. For most surgeons, a 2.2-mm incision created with a specially angled microphaco knife is the method of choice. First, a paracentesis is created with either a knife angled at 15° or a paracentesis knife. The capsulorrhexis is then created, using either an angled needle, a bent cannula, or capsular forceps such as those designed by H.R. Koch (20-gauge, 0.70 mm forceps; Geuder, Heidelberg, Germany).

The next step is phacoemulsification. In the past, we exclusively performed CMP with the Megatron S3P (Geuder); however, we recently added the Megatron S4 (Figure 1) to our practice. This machine has a high-performance hybrid pump system that allows the surgeon to use a conventional peristaltic pumping system with or without the venturi effect. In our experience, the S4 improves on the earlier model, providing better aspiration and thus preventing core fragments from catapulting into the anterior chamber. Vacuum is also more efficient, especially with hard nuclei.

Instead of the 30° mega tips (1.26 mm) commonly used for conventional phacoemulsification, CMP is performed with the CMP US-needle 30° (0.80 mm) or the MCP mega tip, which tapers from a diameter of 1.00 or 0.90 mm to a flagpole of 0.70 mm. We use the thinner phaco needle with a more flexible sleeve (green) for 2.0- to 2.2-mm incisions and the thicker needle with a more rigid sleeve (white) for 2.4-mm incisions (Figure 2). In my opinion, even the larger needle could be used for a 2.2-mm incision with the green sleeve. I typically prefer the green sleeve because it allows a smaller incision; I use the white sleeve only for dense cataracts.

PARAMETERS

In addition to proper selection of CMP accessories according to the incision size (2.4 or 2.2 mm), the surgeon must choose the appropriate IOL and follow established parameters for a successful operation. First, the bottle height should be approximately 10 cm higher than placement for standard phaco. Even though the tighter lumen requires greater infusion pressure, the volume of balanced saline solution used is greatly reduced with smaller incisions.
Second, the amount of ultrasound energy used during CMP is about the same as phacoemulsification performed with incision sizes of 2.8 to 3.2 mm. Therefore, the preset threshold value for ultrasound output on the Geuder system is generally 80% of the maximal energy. The sleeve of the CMP phaco tip seals the wound and reduces the risk of burns.

Third, aspiration of the cortex is performed with a monomanual I/A handpiece. This handpiece is covered with the same sleeve that is used with conventional ultrasound handpieces. The advantages include easier exchange of the handpiece if necessary and optimal wound closure. With use of a monomanual I/A handpiece, incision size is limited to 2.2 or 2.4 mm and one 1.5-mm paracentesis during the entire operation. Only minor wound enlargement may be necessary depending on the size of IOL chosen. Following IOL implantation, the monomanual I/A handpiece enables unproblematic removal of the ophthalmic viscosurgical device. Alternatively, bimanual I/A handpieces can be used; however, for this two paracenteses are necessary.

Fourth, system settings should be comparable to those used with larger incisions (at least 2.8 mm).

**ADVANTAGES**

CMP offers optimal anterior chamber stability and a better view for the surgeon, in particular when using balanced saline solution in patients with small or decreasing pupil size. In our experience, CMP has a shorter learning curve than bimanual phaco or laser phaco.

Samuel Masket, MD, of Los Angeles found that the average induced astigmatism was 0.10 D with CMP, compared with 0.32 D with 3 mm-incision phaco.1 Induced astigmatism could be ascribed to the position of the incision. Dr. Masket also found that the average IOL rotation was 13.1° with CMP compared with 19.1° with conventional phaco. His results showed overall that incisions following CMP were more stable and less prone to postoperative deformation, leakage, and infection.

We have not observed the need for significantly longer phaco times or higher energy levels—often cited as disadvantages of CMP. One reason for this may be the higher vacuum levels (more than 400 mm Hg) we can use with this technique. From an economic standpoint, CMP saves balanced saline solution and improves the surgeon’s view during surgery.

**CONCLUSION**

After our first 20 cases using CMP, we were so impressed with the technique that we now use it in difficult cataract cases to decrease the risk of complications. We prefer to use this technique with a clear corneal approach in patients with high hyperopia, flat chambers, intumescent cataracts, mature cataracts, or pseudoexfoliation, and in cases in which intraoperative floppy iris syndrome is predictable, such as in adipose patients or those with elevated intraocular pressure or hyperopia. CMP promotes a continuously stable anterior chamber and optimal control of the entire procedure.

We employ CMP whenever possible using similar parameters to those established for techniques with a 2.8-mm incision. We have found that converting to microincision phaco is simple. After more than 800 procedures in difficult cases, I have yet to experience a capsular rupture due to the increased stability with CMP. For reasons of effectiveness, we continue to prefer the standard phaco technique for mature and hypermature cataracts.

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