Phaco chop technique extends advantages of bimanual microincision phaco to all eyes

BIMANUAL microincision cataract surgery (MICS) performed with a phaco chop technique enables safe and efficient, minimally invasive lens removal in all eyes, says French ophthalmologist Prof Jean-Claude Rigal-Sastourné MD.

Prof Rigal-Sastourné, Val de Grâce Hospital, Paris, performed bimanual MICS using the Millennium Microsurgical System (Bausch & Lomb). He analysed data collected in a series of 100 eyes operated on with phaco chop and having at least six months of follow-up. Pre-operative slit-lamp evaluations showed the majority of eyes had C1N3 cataracts (LOCS III classification), while 10% had hard nuclei. Posterior subcapsular cataracts were present in 5% of eyes.

Total operating time averaged 13 minutes and the mean absolute phaco time was four seconds. No corneal burns occurred. Postoperatively, visual acuity results were favourable. Mean BCVA was 0.65 on the first day after surgery, with 70% of eyes achieving a BCVA of 0.5 or better. At the one-week follow-up visit, mean BCVA was 0.9 and it was 0.5 or better in 80% of eyes.

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“Phaco chop divides the nucleus without sculpting and allows removal of firm-to-hard nuclei faster and with less energy compared to divide and conquer. Using phaco chop we have now adopted bimanual MICS for all cataract surgery patients,” said Prof Rigal-Sastourné.

“Bimanual MICS has many advantages, and with the opportunity to perform it safely and efficiently in all eyes using phaco chop, continued use of a coaxial technique seems illogical. Just as few surgeons today perform coaxial vitrectomy, we believe bimanual MICS will also become the preferred strategy by nearly all cataract surgeons in the future once they aim to master the technique,” he said.

Horizontal vs. vertical
Phaco chop is performed with either a horizontal or vertical approach and selection between the two depends on features of the cataract. Horizontal chop is used for softer nuclei as well as in high myopes, other eyes with a large anterior chamber, when there has been prior vitrectomy or if the zonules are weak. Vertical chop is performed when an epinucleus is absent since there is an increased risk of capsule rupture with horizontal chop; vertical chop approach is also preferred for very hard, dense nuclei because it facilitates fragmentation.

However, both techniques involve a learning curve, Prof Rigal-Sastourné said.

“In the horizontal technique the surgeon must perform some more complex manoeuvres with the non-dominant hand. With vertical chop that is less of an issue, but it too requires some special training because of the potential for causing damage to the capsulorhexis. Nevertheless, our analyses of total surgical time and absolute ultrasound time indicate the learning curve for phaco chop can be overcome relatively quickly within about 20 to 30 cases,” he noted.

Making the transition
Due to the learning curve for phaco chop, Prof Rigal-Sastourné advised that surgeons should continue using their preferred nuclear fracture technique when first learning bimanual MICS. Use of the “stop and chop” technique, first described by US surgeon Paul Koch MD, offers an excellent method for transitioning to phaco chop.

“Stop and chop is a hybrid of the divide and conquer and chop techniques. It is performed by sculpting an initial trough, but then shifting to the chop technique to divide each heminucleus. With a central trough present, it becomes easier to position the ultrasound probe within the nucleus. Therefore, problems that can occur when performing the chop technique on an intact nucleus are avoided,” Prof Rigal-Sastourné said.

More tips for safer, simpler surgery
Discussing other considerations relating to technique and technology, Prof Rigal-Sastourné said he finds the Millennium Microsurgical System ideally suited for performing bimanual MICS because its advanced fluidics and phaco power modulation systems allow use of high vacuum to optimise the efficiency of lens removal while minimising the risk of temperature elevation and chamber instability. Use of the Millennium IOP control port is also an attribute because it enables accurate control of infusion pressure at 60mm Hg with the bottle height maintained at 40cm.

Prof Rigal-Sastourné also favours a thin-tip Microflow needle (B&L) that offers a 0.9mm diameter and outer-grooved design. “Phaco needle selection is critical in MICS because of its role in maintaining the proper balance between irrigation and aspiration. With its small diameter, this particular needle helps to reduce the required incision size but also provides greater resistance to flow that is helpful for minimising surge. In addition, the outer-grooved design offers a safety benefit for limiting temperature rises that can lead to corneal burns,” he explained.

Prior to attaching the silicone infusion sleeve to the phaco handpiece, Prof Rigal-Sastourné trims off two-thirds of its length so that only the proximal one-third of the needle is covered.

This strategy minimises the tendency for liquid from the phaco needle to spray onto the cornea and impede intraoperative visualisation,” Prof Rigal-Sastourné explained.

For his irrigating chopper, he chose a 19-gauge instrument that has two circular lateral irrigation ports and allows an infusion rate of 40ml/min.

His technique involves creation of two trapezoidal corneal tunnel incisions that measure 1.4mm wide and 1.5mm long. The 1.4mm length is appropriate for insertion of 19-gauge instruments while the trapezoidal shape enables their mobilisation. Prof Rigal-Sastourné places the incisions in the superior and inferior temporal zones in a 90-degree relationship to each other in order to reduce induced astigmatism.

“The value of this method has been confirmed using topographic analysis in eyes implanted with ultra-thin lenses through un-enlarged incisions,” he said.

He creates a 5.0mm capsulorhexis using a microincision capsulorhexis forceps. That size is adequate to allow safe use of the chopper while also minimising the risk for postoperative capsulophymosis that could interfere with visual outcome.

Prior to initiating hydrodissection, Prof Rigal-Sastourné removes some of the viscoelastic by inserting a flat cannula and depressing lightly on the rear edge of the incision while injecting BSS into the anterior chamber.

“Once that is done, hydrodissection itself is easier in MICS because of the pressure within the anterior chamber and because the incisions are sealed,” he observed.

After ensuring the nucleus rotates freely, hydrodelineation is performed so that the epinucleus is freed while a layer of residual cortex remains to protect the capsule. Prof Rigal-Sastourné noted this technique is very helpful for facilitating identification of the zone of instrument positioning during phaco chop.

Prof Rigal-Sastourné is editor of the website of bimanual MICS phaco: www.phacobimanuelle.net. This website is for European surgeons who want to learn this new technique. The main text is in the three major languages: English, Spanish and French.

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