Learning micro incision surgery without the learning curve

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We describe a method of learning micro incision cataract surgery painlessly with the minimum of learning curves. A large-bore or standard anterior chamber maintainer (ACM) facilitates learning without change of machine or preferred surgical technique. Experience with the use of an ACM during phacoemulsification is desirable.

Key words: Anterior chamber maintainer, micro incision cataract surgery, phacoemulsification

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Introduction

Surgery for cataract has witnessed a technological revolution and the advances continue.[1] The situation in India, a country that performs nearly four million cataracts extractions annually, is particularly exciting.[2] While extra-capsular and manual small incision surgery are the predominant techniques in current use, most ophthalmologists naturally aspire towards the technologically advanced phacoemulsification as a next step or preferred method. The technology and technique of phacoemulsification too have seen rapid advances. Safer machines with advanced software allow surgeons to perform cataract surgery safely with less and less ultrasound power.[3] The search for smaller and smaller incisions too continues. Towards this end, "micro incision" cataract surgery (MICS) is now becoming popular.[4] In order to decrease the size of the incision, MICS requires the use of a "naked" phacoemulsification needle, that is, a needle without the irrigating sleeve. The increased risk of incision burn is addressed by "cold" phaco technology.[5] The rollable lenses for insertion through this type of incision do not have the track record of usual foldable lenses; many using this technique would also insert an endocapsular ring to prevent shrinkage of the bag. The literature on the subject is sparse, with studies showing no real advantage of MICS over standard phacoemulsification.[6,7] There is, however, a market value for the latest in surgical techniques. There is also another, perhaps more legitimate need to master MICS: such a technique or modification thereof would be required to use the much-awaited injectable intraocular lenses.

We describe an approach to achieve skill in MICS without any change in machine or phacoemulsification technique that can be achieved with the minimum of learning curves.

Learning micro incision cataract surgery

1. Anesthesia: While there is no need to change your preferred technique of anesthesia, we make an argument for a formal "block" while in the learning stage.
2. The details described hereafter is applicable to right eye. A standard 20-gauge myringotomy blade is used to make a paracentesis incision in the upper temporal quadrant around the 10 o'clock position [Fig. 1]. This incision is primarily used for the phacoemulsification.
3. The chamber is deepened with the preferred viscous or visco-elastic agent.
4. A continuous curvilinear capsulotomy is performed in the usual manner with a bent needle introduced through the paracentesis incision. The diameter of the capsulotomy is about 5.5 mm.
5. The myringotomy blade is used to make another paracentesis incision at 6 o'clock [Fig. 2]. This incision is used to insert and fixate the anterior chamber maintainer (ACM). Accordingly, we try to create an incision with an intra-stromal length of 1.5 mm. Alternatively, a paracentesis similar to the first, but with a longer intra-stromal track is created at the 7 o'clock position. An ACM [Fig. 3] attached to a bottle of irrigating fluid is inserted into the anterior chamber and the stop-cock is opened. The ACM can be the same as that used for standard Blumenthal Cataract surgery (Visitech Instruments Fl, USA; catalogue number: 58514). If you use this ACM, we would suggest that you also use an irrigating chopper. We prefer to use a slightly larger bore ACM designed by Professor Ehud Assia (Ccrnea infusion terminal; Ophthaltech; Switzerland). Even with this ACM, we prefer the extra irrigation from an irrigating chopper, which almost eliminates fluctuations in chamber depth. We have used the regular chopper and technique too but then have to accept and be prepared for the slight anterior chamber fluctuations that may occur. Whatever the ACM used, the higher the bottle height, the better.
6. A paracentesis incision is made approximately 90 degrees away from the incision that has been created for phacoemulsification.
7. The sleeve for the phacoemulsification needle is cut at its base. The "naked" phacoemulsification needle is introduced into the anterior chamber through the supero-temporal incision. The irrigating chopper or preferred instrument is introduced through the incision created for this purpose. Phacoemulsification is performed using the surgeons preferred technique. We use the stop and chop method [Fig. 4].
8. The cortex is extracted using a single port aspiration

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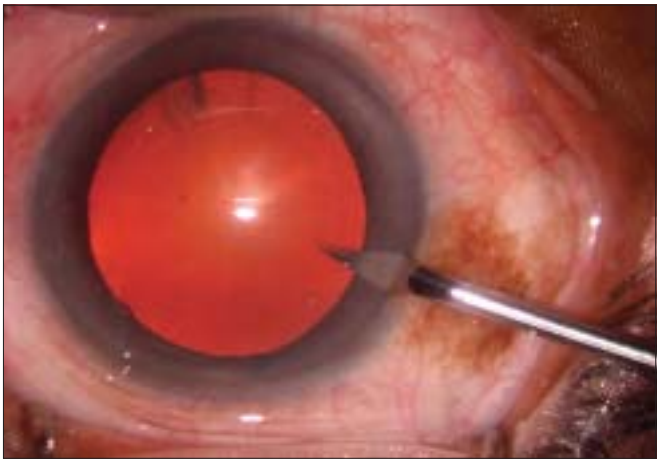

Figure 1: A myringotomy knife is used to create a beveled incision in the upper temporal quadrant, right eye

Figure 2: Another paracentesis incision with a longer intra-stromal course is created at the 6 o'clock position, right eye

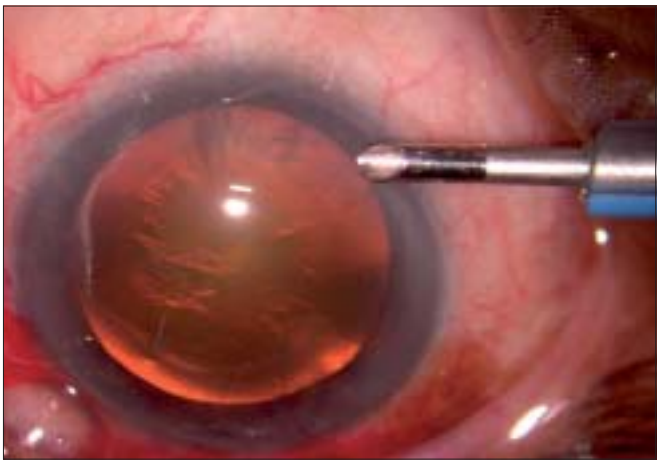

Figure 3: A large-bore anterior chamber maintainer (Ophthaltech, Switzerland) is inserted into the anterior chamber, right eye

Figure 4: Phacoemulsification is performed using the "naked" phacoemulsification needle and an irrigating chopper. The anterior chamber maintainer (large-bore or regular) and the chopper maintain the anterior chamber and prevent a burn, right eye

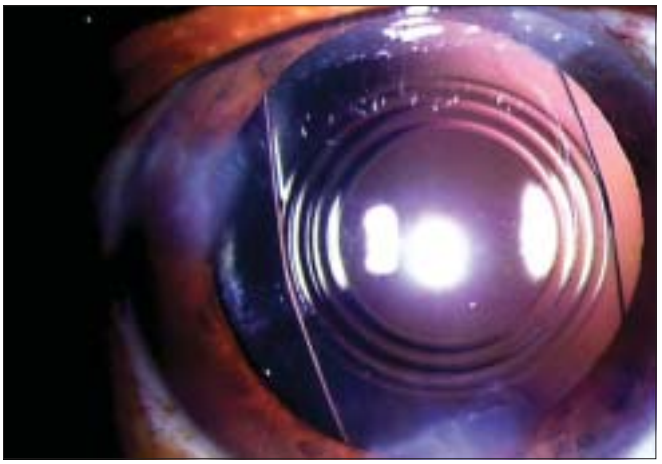

Figure 5: First postoperative day, showing the rollable lens *in situ*. The pupil was dilated for the photograph. Notice the hydrated paracentesis incisions, right eye

canula attached to a syringe and introduced through one of the incisions as is usual with the Blumenthal technique. Alternatively, a canula attached to the machine can be used for this step. The availability of two incisions allows easy access to the cortex that might otherwise be difficult to access.

9. An endo-capsular ring is inserted into the capsular bag. This can be done with the ACM open or with a visco surgical device filling the anterior chamber. We prefer to extend the wound slightly and use an injector for this step, but this can easily be done with using forceps too.
10. If the wound has not been extended to inject the endo-capsular ring, it is now extended slightly. Just enough to accept the cartridge for the rollable IOL (IOCARE; Baroda; India). The lens is injected into the capsular bag. This step too can be done with the ACM or with visco surgical device.
11. Any visco surgical device is aspirated using the single port canula attached to a syringe or using the machine. The

ACM is removed and the incisions hydrated to achieve a watertight wound.

12. The first postoperative day picture is shown in Fig. 5. The hydrated incisions are clearly visible. This usually clears by the first week visit.

This technique of learning MICS was used by the senior author to teach himself in nine cases. The assessment of ease of performance was subjective. The cases selected had a minimum pupillary dilatation of 5.5 mm, nuclear sclerosis up to Grade 3; one patient had a mature cataract. There were no complications related to the technique: corneal burns were not encountered. The subjective assessment of fluctuations was no different than with regular phacoemulsfication performed by the same author; the irrigating chopper was used to further stabilize the chamber if any fluctuation was encountered. Two patients had hydration of the incision used for phacoemulsification. In one patient this interfered with the removal of the epinucleus and made the insertion of the endocapsular ring more difficult than usual. Mild hydration of the phaco wound and mild Descemet's folds were seen on Day 1 in all cases. The uncorrected visual acuity at one week ranged from 20/80 to 20/ 30. The uncorrected and best-corrected visual acuity at five weeks ranged from 20/60 to 20/ 25 and 20/25 to 20/20 respectively.

Discussion

For those who are familiar with the use of the ACM for the Blumenthal technique and have used it for phacoemulsification too, this switch from regular phacoemulsification to MICS is literally without a learning curve. For reasons discussed elsewhere, we have recommended and used the ACM even for routine phacoemulsification.[8] Not least of these is that it makes teaching of routine phacoemulsification so easy. And following discussions with and a demonstration by Prof Assia, we realized that we could perform MICS without too much difficulty and without any change in technique. While we usually use "cold" phaco (Sovereign; AMO; India), we have used other machines such as the Legacy (Alcon; India) as well. The ACM prevents corneal burns. In fact, since starting phacoemulsifcation in 1992, the author (RT) has not had a single corneal burn. We attribute this to the use of the ACM.

The larger bore maintainer and a higher bottle height prevent fluctuations of the anterior chamber. The added irrigation from an irrigating chopper provides additional safety. We would certainly recommend this while using the usual Blumenthal ACM.

What if we run into trouble and need to convert? What if there is a posterior capsular rent? As with regular phacoemulsification, knowledge of manual small incision cataract surgery (MSICS) is of help here. The corneal wound is ignored. A conjunctival incision is made and we proceed with the Blumenthal technique of MSICS described elsewhere.[8] If the posterior capsule has been breached and vitreous is in the anterior chamber (best checked with an endo-illuminator), the bottle height is lowered and a partial anterior vitrectomy is performed using the paracentesis incision. With the ACM on, the second hand is free to sweep vitreous from the wound and perform other maneuvers.

We acknowledge some major limitations of this article. The technique and learning curve described is for a reasonably experienced surgeon. Accordingly, the method is ideally extrapolated to those with similar experience in routine phacoemulsification. The amount of prior skill required to learn this technique safely in the manner described is unknown; it is our impression however that it would not require a 17-year track record. Experience with the use of the ACM is desirable and easily obtained. Assessment of anterior chamber fluctuations and corneal hydration were subjective. Finally, while no complications were encountered in this series, the true rate of complications could be as high as 28%.[9] Keeping in mind that we have encountered no corneal burns in 17 years, as the technique is essentially the same, the incidence of this complication at least is likely to be rare. There is no reason why the incidence of other complications of phacoemulsification should be any different.

In summary, we have described how the use of an appropriate ACM and chopper can help acquire skill in MICS. For a surgeon familiar with the use of the ACM or willing to try its use in phacoemulsification, performing MICS should not require additional expert assistance.

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