For phaco incisions, smaller is getting better

For this month’s issue with its special focus on MICS, EuroTimes assistant editor Roibeard O’Eineachain spoke with Jorge Alio M.D., the Spanish ophthalmologist who coined the acronym for the procedure and who has been at the forefront of the research and development of the techniques and technology of microincisional cataract surgery.

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ET: What is really meant by MICS, how small does a phaco incision have to be to fit MICS criteria?
Alio: To be considered as microincision cataract surgery, or MICS, the incision should be sub-2.0 mm because this is the limit at which the astigmatism induction is neutral. Today, the average MICS incision is 1.7 mm and the lower limit is 0.7 mm, so

Alio: In the November 2005 issue of Ophthalmology we have published a study in which we showed that by using MICS we significantly decreased the mean phaco time by decreasing the mean phaco power. Most likely this results from the high vacuum power that we use for the surgery and the good balance of fluids created by the non-leaky incisions in MICS. The change in the paradigm of lens removal at this moment is to use less phaco energy and more vacuum, which is not as aggressive for the eye as phaco energy. This is part of the benefit of MICS.

ET: Has this resulted in lower endothelial cell loss?
Alio: In our published study, there was a lower loss of endothelial cell counts after MICS but this was not yet significant, because we didn’t decrease the circulation of fluid inside the eye. We are currently investigating the effects of MICS with sub-1.0 mm incisions. It is our opinion that thanks to a further improvement in the control of the fluids we are getting lower endothelial cell loss with the sub-1.0 mm incision than with standard phacoemulsification.

ET: Are there other improvements in the technology of phacoemulsification that have also improved the outcomes of MICS procedures?
Alio: The main improvement is one of global value, even in coaxial phaco, and that is the knowledge of how to use the ultrasound. We now not only use the fluids better, which is the first thing that we have achieved with MICS, but indeed we have gained a better knowledge in the use of phaco power. Before, phaco power was used in a linear continuous mode. Now, pulse-mode phaco, with its low intensity phaco powers and high vacuum, lets us dissolve even dense cataracts with much less phaco power. So phaco time is reduced because we are using the phaco energy better and we have better software. This improvement has been led by MICS techniques, which have forced us to improve the fluids and decrease the phaco power. The goal of MICS has always been to decrease the trauma of surgery by reducing the induced astigmatism and decreasing the aggressiveness of the phacoemulsification itself.

ET: Have irrigating choppers added to the success of MICS procedures?
Alio: When using high vacuum levels you need to optimise the fluids by increasing the inflow. Irrigating choppers were designed to keep the volume of the anterior chamber in stable condition when you are using high vacuum. That was the idea behind the new irrigating probes, including my own design the irrigating “stinger” that faces down and irrigates inside the capsular bag. The probe delivers at least 70cc of fluid per minute so that it is enough to compensate for the suction of fluid that you have with the aspiration probe. But we have changed the concept of chopping to the concept of stinging. The stinger acts as a chopper during fragmentation but is less aggressive than a chopper and is a much more adequate, much more elegant, and much better handling instrument than the irrigating choppers that are currently available. It also provides an excellent way to control the particles and prevent them from obstructing the aspiration probe. In addition, it helps your phacoemulsificator tip to manipulate and eliminate small fragments. This is a new piece of instrumentation that is available through Katena and we are now introducing a new one from Duet, which is the ultra-MICS irrigating stinger and goes through a 0.7 mm incision.

ET: With the MICS procedure is it necessary to have an IOL that you can implant through an unlarged incision to still retain some of the benefits?
Alio: In the history of cataract surgery the development of lenses have lagged behind that of the surgery. We started with phacoemulsification using small incisions but with no lenses available to implant through them. It’s the same story with MICS. We have introduced a new type of surgery which is better, in my opinion, even without the adequate lenses. Now such lenses are available and we have several peer-reviewed publications demonstrating that the MICS lenses, including the different types of Acri.Smart and ThinOptX IOLs, are as good or even better than the other types of lenses used today. You can safely implant them through sub-2.0 mm incisions and the complications are the same and maybe even less than with ordinary lenses. With regard to lenses for sub-1.0 mm incisions there is a need for further development in technology, but I think the ThinOptX technology is in a better position than the others to create lenses that go through sub-1.0 mm incisions without any negative effect on the optical performance of the lens.

ET: So the new lenses are the equivalent in terms of safety efficacy and predictability as conventional IOLs?

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Alio: Absolutely. One paper that we have published in the JCRS has demonstrated that the Acry.Smart lenses are equivalent to the modern Acrysof lens in terms of MTF, PSF, refractive outcome and all the quality standards of IOLs. They also have the added value that pseudocommodation of 0.75 D is present in almost every case implanted with the Acry.Smart lens. The ThinOptX lens has a number of advantages including a lower rate of PCO and the fact that it fits through a smaller incision. We have a paper in the last issue of Current Opinion in Ophthalmology in which our data showed that the MTF of the ThinOptX is even superior to that of standard Acrysof lenses. So, that means we have no difference in quality, in fact, we even have improvements in quality with MICS lenses compared with standard lenses.

ET: How do you think the Acry.Smart lenses achieve their pseudocommodative effect?

Alio: We don’t have a real answer as to why these lenses are pseudocommodating but in some cases that we have been following with modern wavefront technologies we have demonstrated that there is an increase in coma values when accommodation is in progress. What this suggests is that pseudocommodation is due to a change in its shape but not in its position in response to the action of the ciliary body on the capsular bag which increases coma and depth of focus. This variation in coma is not perceived as unpleasant by the patient but rather as good for near vision performance.

ET: There is currently a lot of debate about bi-manual vs coaxial for ultra-small incision surgery. The coaxial camp maintain that MICS has a steeper learning curve and requires more special instrumentation and they say that the results are as good as with coaxial. What is your opinion?

Alio: There is a transition from one technique to another in which you have to learn. To learn is always painful and there is what is called the learning curve in which you have more complications. The same thing happened when we made the transition from ECCE to phaco, and phaco is certainly here to stay. MICS is a better surgery and the change to MICS is driven by the better operative control it allows, and surgeons love the idea of using small incisions. It is the new frontier of cataract surgery and it has improved our surgical standards and has increased our surgical knowledge. MICS has forced us to gain a better knowledge of the fluidics and the use of phaco power and in doing so it has made us better surgeons. This is a fact. Transition needs some investment in new instrumentation but for the most part it’s not that expensive. The most expensive part is that you need the newer phaco machines with improved fluidic control (the so-called Advanced fluidic system phacoemulsification machine) to do a better MICS surgery. But this is a transition that every surgeon has to make even if they are doing coaxial phaco, because these newer phacoemulsification machines are better than the previous ones in all senses, better fluidic control, better phacoemulsification and better software. This is useful for coaxial surgeons and for MICS surgeons is a real advantage.

ET: Are there specific types of eye that may gain particular benefit from MICS procedures?

Alio: The number one patient that benefits from MICS is the patient that has undergone previous corneal surgery. Every surgeon that operates on patients with previous radial keratotomy, LASIK or PRK knows that these corneas are unstable under the stress of large incisions and the same is true of corneas that have undergone penetrating keratoplasty. One of the great advantages of MICS is that in these cases you don’t modify the astigmatism of the eye and that makes these corneas much more stable postoperatively. As a result, the refraction of the eye can be calculated much more accurately.

ET: Are there eyes where MICS might be contraindicated?

Alio: Probably yes. I don’t recommend doing MICS in very advanced cataracts or in brunescent cataracts, which are difficult with ordinary phaco surgery and would be even more difficult with MICS. I advise surgeons that are in the learning curve to start with easy cases up to grade 3 and then move to grade 4 later on. Brunescent cataracts are a challenge to every surgeon even with regular phacoemulsification. Another potential contraindication is eyes that have pseudoexfoliation, they frequently need capsular rings and these rings are inserted more easily through coaxial incisions than through MICS incisions. And we don’t have either the experience or the technology to make these rings better handled through micro-incisions.

ET: What do you think is on the horizon for MICS in terms of surgical techniques and IOL and phaco technology?

Alio: First, we are improving our technology for going through sub-1.0 mm incisions and this is indeed a marvellous challenge and I am currently doing most of my cases though ultra-micro incisions of 0.7 mm with the new intervention of Duet company (UM). Secondly, with this instrument and others under development we have more effective instruments for handling the cataract within the eye, and third, we need to have IO Ls which can be placed through sub 1.0 mm incisions. This is the new challenge for IO L companies. In the meantime the lenses that I have implanted through 1.7 mm incisions are the gold standard for this type of surgery. We will also have new technologies that use more cavitational energy that will allow us to remove a lens through small incisions less than 0.7 mm, but this is the future.