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The growing trend towards reducing incision size.
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By Professor Jorge J. ALI MD, PhD (Alicante, Spain)

I created and registered the term microincision cataract surgery (MICS) in 2001, aiming to identify a specific trend of cataract surgery towards surgery with incisions of less than 2 mm. MICS can be performed with different types of energy, using different instruments, but ultimately involves two main issues: First, to decrease the incision size to the minimum level – now, in real practice, in the range between 1.9-2.1 mm; and second, to separate the functions of irrigation and aspiration through two independent incisions handled bimanually.

Improving patient outcomes

But what are the reasons that are leading to this new concept of surgery? The reasons are clear; simply the natural evolution of techniques and training in cataract surgery are driving the trend towards reducing incision size. Cataract surgeons through time have been looking for safer techniques, decreasing the incision size and improving outcomes through reduced surgical trauma. These are the main goals of MICS in this logical approach started some years ago, first with the so-called ”microincision”, which is coaxial phacoemulsification performed through incisions of around 2.2 mm, and then progressively towards sub 1.0 mm. The limits of MICS (excluding IOL implantation) are currently 0.7 mm (21 gauge). In the future, in a continuous progressive process, incision size will most probably end with just minimal punctures and no more incisions for lens removal.

Separating irrigation and aspiration

So MICS is not only a decrease in incision size, but also a separation in functions of irrigation and aspiration. Aiming for a final dramatic change in cataract surgery with minimal incisions, the continuing trend to reduce incision size requires the separation of these functions. MICS at this moment is probably still in early adoption by the more advanced surgeons conducting more challenging cases. But there are definite reasons for all cataract surgeons to adopt this technique in their routine practice. The advantages can be summarized as surgical improvements and optical advantages.

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Decreasing surgical trauma

There is consistent evidence to state that MICS decreases effective phaco time by decreasing total phaco power used for cataract extraction up to grade 4, thereby increasing the surgical control and decreasing surgical trauma which occurs with SKS (small incision phacoemulsification). MICS will improve also your everyday practice by eliminating outflow from the incisions and avoiding the uncomfortable IFS syndrome (intraoperative floppy iris syndrome) which in real practice affects many elderly men having prosthetic pharmacological therapy. All these advantages clearly separate MICS from small incision phacoemulsification.

Reducing astigmatism

The degeneration of optical performances of the cornea after incisional cataract surgery limits the visual quality of the pseudophakic eye. In conventional coaxial phacoemulsification, or SKS, anterior chamber infusion is supplied through coaxial systems through incision sizes ranging from 2.5 to 3.2 mm to accommodate infusion sleeves and provide adequate inflow.

In MICS, each instrument (the sleeveless phaco tip needle and the irrigating instrument connected to the infusion line) are inserted through clear corneal incisions of approximately 0.9 to 1.5 mm. The new intraocular lens technology makes it possible to inject an IOL through an incision of around 1.5 to 1.8 mm. Consistent studies have demonstrated the advantages of MICS over small incision cataract surgery in reducing astigmatism, aberration and improving the optical quality of the cornea after surgery.1

Importance of the correct tools and settings

The advantages of MICS can only be obtained if the MICS surgeon follows several fundamental requirements: You need a phaco machine optimised for MICS. You need specific instruments, especially the irrigating probe. You need a high quality IOL, injectable through incisions from 1.6 to 1.8 mm. Finally, you need to be prepared to obtain the adequate medical education to be successful from the beginning when using this new technology.

An advanced fluidic system phaco machine such as the MI-600™ phaco system or the Stellaris™ phaco system available later this year, specifically created for MICS, permits precise control of vacuum, irrigation and aspiration. You have to use the right parameters to make this instrument successful in your hands. Specifically designed and high-quality instruments are required for the MICS technique, and there is no question for me, that the downturn irrigation probe with the stinger at the tip is the most useful instrument for MICS that I have known. This instrument allows you to perform surgery with only one instrument from the beginning to the end, having the potential for chopping, separating and looking for fragmented and assisting aspiration with hard fragments that could eventually block the aspiration hole.

These irrigating instruments should have adequate inflow and aspiration should be precisely controlled by the advanced fluidic phaco machine in order to have a fully stable anterior chamber. These instruments should be introduced through calibrated incisions, requiring precise blades that exactly produce the optimum incision size and shape. Lastly, you need a good intraocular lens. The recently introduced Akreos IOL and the Akreos M-I, are the most modern IOL that incorporates most of the issues that we request from an IOL: an aspheric profile, biological tolerance, in-the-bag stability, plus ease of injection and handling once inside the eye.

References


Importance of education and training

On top of all of these factors, is medical education. I strongly recommend you attend seminars on MICS or approach those doctors who are already experienced in MICS in order to obtain the correct phaco parameters that you need to use in your phaco machine.

Good luck in your first cases and I am sure that you will love it. I. M.

Jorge Ali

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The Akreos MI-60 lens for 1.8 mm MICS is now available in Europe

Rausch & Lamb’s new Akreos AO Micro Incision Lens – the Akreos MI-60 lens, recently became available in Europe. The lens has been specifically developed for 1.8 mm Micro Incision Cataract Surgery (MICS™). Its innovative design allows implantation through a 1.8 mm incision, whilst maintaining the optical quality, stability, and low posterior capsule opacification (PCO) rates associated with the parent Akreos AO lens design.

The Akreos MI-60 lens can be implanted through a 1.8 mm incision using a wound-assisted injection technique which minimises corneal stress. The lens is made from the same hydrophilic acrylic material as the Akreos AO lens. This biocompatible material has a long-term safety record, implanted in over 1.5 million eyes worldwide since the first implantation in 1996. The lens is 30% thinner than its parent Akreos AO design, enabling the 1.8 mm injection. Lens stability is maintained with a unique, 4-point haptic design, based upon the Akreos AO lens design with a novel haptic shape which absorbs compression forces in 3-dimensions. The haptics bend under the contraction forces during capsular bag contraction, without transferring the forces to the optic.

First European experiences with the Akreos® AO MI-60 lens

Four of our European Key Opinion Leaders have provided some very helpful insights into their first impressions of Akreos MI-60 lenses and its clinical performance, which we wish to share with you.

1. Dr Nobacht, from Cariesis, Wilhelmina Hospital, The Netherlands.

Dr Nobacht commented on the lens design: “A great advantage of the lens design is its ability to unfold slowly in the capsular bag, so the surgeon has time to implant the lens with one smooth, easy, and precise manoeuvre.” Dr Nobacht added, “I have implanted 40 Akreos MI-60 lenses to date, as part of an initial clinical evaluation into the lens, conducted with my colleague, Dr Rockelmaars. These cases have been performed using coaxial phaco and 2.8 mm incision. Dr Nobacht plans to transition to sub 2 mm bimanual MICS early 2007. Based on his first experiences, Dr Nobacht is very satisfied with the Akreos MI-60, finding it very easy to insert into the capsular bag. “A good advantage of the lens design is in its ability to unfold slowly in the capsular bag, so the surgeon has time to implant the lens with one smooth, easy, and precise manoeuvre.” Dr Nobacht said, “I have implanted 40 Akreos MI-60 lenses to date, as part of an initial clinical evaluation into the lens, conducted with my colleague, Dr Rockelmaars. These cases have been performed using coaxial phaco and 2.8 mm incision. Dr Nobacht plans to transition to sub 2 mm bimanual MICS early 2007. Based on his first experiences, Dr Nobacht is very satisfied with the Akreos MI-60, finding it very easy to insert into the capsular bag. “A good advantage of the lens design is its ability to unfold slowly in the capsular bag, so the surgeon has time to implant the lens with one smooth, easy, and precise manoeuvre.”

2. Dr de Lint, also from the Netherlands.

Dr de Lint has been enthused about the lens design: “I have found the lens unfold very well, with the haptics unfolding slowly, unlike other lenses he has used. The lens automatically pushes against the posterior of the lens capsule, which is very stable. The lens design ensures the lens can only be implanted in one place.” Dr de Lint also finds it easy to remove viscoelastic following implantation.

3. Dr Støle, from the University Hospital of Stavanger, has already performed 30 cases with the new lens, using bimanual MICS. The initial incision is approximately 1.3 mm during lens removal, increasing the implantation incision to 1.8 mm.

4. Dr State, from Vatne Eye Hospital, has performed 15 cases with the Akreos MI-60 lens to date and said that “the best lens so far”. Dr de Lint has had a very positive experience during lens injection for flat and haptics, his technique involving two 1.3 mm incisions for bimanual phaco. He has been waiting for a suitable lens, saying that “anything requiring an incision over 2 mm does not allow the incision wound to close straight away”. During his first experiences with the Akreos MI-60 lens, Dr de Lint has been implanting the lens through an incision size of 1.7 mm. He is very satisfied with the entrance of the lens into the capsular bag, using the wound-assisted technique. He finds the injector action very controlled, natural, with a consistent action. “The lens can be implanted without disturbing the wound architecture. This is a big advantage.” he enthused. Dr de Lint recommends the implantation should be performed carefully and slowly, in one action and without hesitation, to avoid the risk of the lens unfolding within the wound.

All patients are satisfied and have not complained about glare or halo after 6-7 weeks.

Patients are very satisfied at 1-day post-op follow-up, with no complaints of pinstriping. There was no sign of drusen or folds in the lens, which can be evident if the lens is under any tension. Dr de Lint commented that the Akreos MI-60 lens has uniform tension across the optic.

5. Mr Jeff Kwartz, UK based surgeon, from the Royal Bolton Hospital.

Mr Kwartz says the plunger system, a Medicel injector, is different to the polyfluorinated silicone plunger within the injector system. Dr Kwartz has been using the lens for over 30 cases with the new lens, using 1.8 mm and 1.9 mm incisions. Currently implanting the lens with a 2.75 mm handheld cannula, he also finds it easy to remove viscoelastic and his patients are all satisfied postoperatively. Although his lens incision is very tight, Mr Kwartz says the plunger system is easier. A medical injector is different to the AO AO injector system, owing to the presence of the deformable silicone plunger within the injector system.

Norwegian surgeon, Dr Eivind Støle, from the University Hospital of Stavanger, has already performed 30 cases with the new lens, using bimanual MICS. The initial incision is approximately 1.3 mm during lens removal, increasing the implantation incision to 1.8 mm. Dr State implant lenses using the wound-assisted technique. The incision size required for this lens is approximately 1.8 mm and 1.9 mm following implantation. The lens is easy to place in the capsular bag and the haptics are in place without incident. Dr State said, “I have had one incident of the lens unfolding outside the eye as a result of too tight an incision, but the IOL could be re-implanted without problems.”

Dr State has found that making the patient look in the direction of the injector when using the wound-assisted technique, makes the implantation easier. The surgeon should achieve adequate pressure of the injector tip towards the incision. Dr State also advises surgeons to make sure the anterior chamber is sufficiently filled with ophthalmic viscosurgical device (OVD) during implantation, as a soft eye will make the implantation through a tight incision very difficult.

Both Dr State and Mr Kwartz comment that since the nugget of the IOL is inside the anterior chamber, the surgeon can, if needed, use a second instrument to facilitate the placement of the haptic in the capsular bag.
The link between vacuum and flow is finally broken! concluded Dr Ann Haustermans, from Belgium, in her video comparing the standard tubing with the Stable Chamber Tubing System. Dr Haustermans presented her findings in a video presentation during the XXIV Congress of the ESCRS, in London September 2006.

The stable chamber tubing system was developed to maintain positive intraocular pressure (IOP) during surgery and help provide surge-free phaco surgery at high vacuums. This is achieved through the use of smaller internal diameter tubing of 1 mm to create resistance to flow throughout the entire hydraulic circuit. A unique filter is integrated into the aspiration tubing system. The filter captures particles larger than 0.5 mm, yet still allows the free flow of fluid through the line, preventing clogging of the aspiration line.

The advantages of the system:

- Vacuum levels can be raised up to 350-400 mmHg without significantly increasing the aspiration flow rate, maintaining the anterior chamber depth and stability
- Surgeon can use needles with larger inner diameters (ID), the MicroFlow Plus or Standard needle for enhanced nuclear purchase while maintaining a controlled aspiration flow rate.

Dr Haustermans’ video first compared the standard tubing with the stable chamber tubing in artificial eyes, performing bimanual phaco with the Millennium™ phaco system. The eye collapsed during surgery when standard tubing was used, whereas the other eye remained stable throughout the procedure with the stable chamber system, even when the same high vacuum was used on both artificial eyes.

The second part of the video demonstrated the use of the system in live patients with either coaxial or bimanual phaco. During the bimanual phaco procedure, Dr Haustermans said “Whereas the stable chamber tubing system allows us to work at higher vacuum levels in standard coaxial surgery, bimanual phaco is the ideal application for these tubing. The problem with bimanual phaco is that the amount of inflow is limited by the suction of the irrigating chopper. The decreased inflow rate lends more easily to surgery when using higher vacuum levels. With the stable chamber tubing controlling the aspiration flow rate, the anterior chamber remains extremely stable.”

Dr Haustermans concluded, “Higher vacuum levels provide superior holding power and increase followability. However, up to recently, chamber stability and post-occlusion surge have been limiting our maximum vacuum settings. Thanks to the restricted inner diameter aspiration tubing of the new stable chamber system, vacuum levels can now be raised significantly without increasing the aspiration flow rate.”
Introducing the Bausch & Lomb Stellaris™ Vision Enhancement System: A complete 1.8mm MICS solution.

The new Bausch & Lomb micro incision cataract surgery (MICS) platform is now complete with the introduction of the Stellaris™ Vision Enhancement System. Developed in conjunction with leading cataract surgeons from around the world, Stellaris represents the ideal combination of forward-thinking technology and efficiency-enhancing automation.

Together with the Akreos™ Micro Incision Lens, customized MICS instrumentation and the exclusive MICS Education Program, Stellaris is the cornerstone of a comprehensive MICS Platform that is all about surgeon empowerment.

www.MICSplatform.com