A new lens for Micro Incision Cataract Surgery. Looking for the balance between plasticity and optical quality.

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Dr. Verges' talk focused on an intraocular lens for use with the bi-manual micro-incision cataract surgery (MICS) technique. According to Dr. Verges, an appropriate IOL has to be designed to be stable in the bag and must demonstrate excellent optical quality to reach current standards. Ioltech S.A., a company of Carl Zeiss Meditec, has developed such an IOL, which is designed to be implanted through a sub 2 mm incision. Dr. Verges presented results of a one-year follow up study, carried out with 48 patients who underwent MICS lens.

Modern cataract surgery has changed over the last few years. Technology allows us to advance towards one of the most important aims in surgery, to reduce surgical trauma. Two main consequences appear from this objective, a rapid visual recovery, and a safer surgery.

In 2001 at the ESCRS meeting in Amsterdam, a new concept in cataract surgery was presented, the micropulsed ultrasound. Based on Phaco laser experience the new system was developed to resolve the temperature tissue damages related to continuous ultrasound. At present, there are different companies with this type of software that allow many combinations to be adjusted to every kind of cataract and every surgeon style.

Two main consequences came from this new technology, (1) the possibility to separate the irrigation and aspiration lines (Bimanual techniques) and, (2) reduce corneal length incision that means a more closed anterior chamber. There are different names for these techniques and one of the most popular is "Bimanual Micro Incision Cataract Surgery" or Bimanual MICS. At present, we have needles and instruments of 20 and 21 gauges to implement incisions of no more than 1.2 mm. An important consequence of that is a reduction in leakage through the incisions during surgery with a better control of anterior chamber stability. A more closed chamber permits to reduce the setting of our Phaco machine. We can adjust the flow to a 20 ml/min; we will immediately obtain a better reproducibility, and reduce the vacuum as well, approximately at 200 mmHg (personal experience). With these parameters and Phaco power of 10% and a duty cycle of 50%, we can improve reproducibility and reduce the chattering effect. The final result is a safer surgery and easier manoeuvers. Reduction in total volume through the anterior chamber has been related to the lower loss of endothelial cells. In our case, with the setting referred before, we have an average of 2 – 3% cell loss.

In spite of the advances of these techniques, we still need to improve Phaco machines, surgical instruments, and especially, the intraocular lens. Different lenses have been presented during recent years. Two main factors are critical with these lenses, the possibility to be implanted through a small incision and to maintain the stability and optical qualities of the conventional lenses. Actually, the majority of these lenses have poor stability with geometries that are not the best for visual quality. It must be a balance between materials, plasticity, and optical designs. We

have pointed out the advantages in reduction the incisional length but we still need to implant the lens through the incision, which means a better plasticity without impairing optical features. Surgeons are looking for lenses that allow the best vision for the patients, this implies that incisional length should be a secondary issue. We are asking the companies to manufacture lenses that combine plasticity and optical quality.

Following this approach, Ioltech SA, a company of Carl Zeiss Meditec, has created a new lens for small incisions, the MICS Lens. I have had the opportunity to collaborate in the design and clinical protocol of this lens. The MICS Lens is biconvex 12 mm total diameter, 5.5 mm optical zone diameter, square edge and 13º between haptics and optics. The lens is made of hydrophilic acrylic with a great plasticity maintaining optical conditions. Its implantation is easy and its stability in the bag is good with a high capacity of absorbing bag retraction afterwards. With tilting conditions of 8º and decentration of 0.5 mm the MTF (Modulation Transfer Function) remains elevated because of its optimised optic profile. Big diameter and the angulations between optic and haptics make it possible to position the lens in a good posterior location (6 mm from the corneal epithelium, approximately). This positioning has many advantages. First, the optical conditions, because its nodal plane positioning is related to better tolerance of descentration and tilting effects, lack of image magnification phenomena, and better "effective pupil diameter". On the other hand, posterior location and increased diameter are related to better contact with the posterior capsule. This reduces the PCO and tightens the capsule avoiding folds that could impair vision.

A final advantage is related to the preoperative calculation for the IOL power. As the lens is positioned in a good posterior location, over the posterior capsule of the natural lens, if we can measure this distance we will have the ELP (effective lens position) value to be used in any formula.

We have carried out a study with 48 consecutive cataractous patients (range 55 to 73 years) that underwent the MICS bimanual surgery technique and implant the new MICS lens through an incision of 2 mm. After 1 year follow up 92% of the patients reported 20/25 UCVA and 96% BCVA > 20/25. 64% of the patients showed UCVA > 20/25 with a 40% contrast sensitivity, increasing to 73% of the patients with BCVA. Three cases reported glistening signs but it seems that vision was not affected. Two cases showed a folded haptic due to capsular retraction, although the IOL position and the vision were not affected.

We know that more research is necessary to improve lenses for implantation through small incisions, but we are sure that with this new lens, the MICS lens, we have a new generation of lenses that will improve our patients' lives.