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Stellaris PC: Next-generation Technology

An advanced combined platform for anterior and posterior segment surgery

CONTENTS

The views expressed in this supplement represent the professional experience of the physicians.

Stellaris PC: Next-generation Vitrectomy Technology

A new combination vitrectomy and cataract platform offers advanced capabilities for retinal procedures.

BY CARL C. AWH, MD

Several years ago, I was fortunate to be part of a team of surgeons who were asked by Bausch + Lomb (Aliso Viejo, California) to work on the next generation vitrectomy system to replace the Millennium. The engineers asked us to devise a wish list of features for the new machine and in turn, our team produced a relatively long list, which included some practical items (eg, faster cutter) and some not-so-practical items (eg, mp3 player). After time and discussion, however, we agreed that because Bausch + Lomb is a global company that serves surgeons from a variety of regions and economies, the best machine to build would not be over-engineered or overly expensive, but would be an elegant, state-of-the-art system focused primarily on improving patient outcomes and safety. The result of these early discussions and subsequent developments is the Stellaris PC.

The next-generation technology that is included on the Stellaris PC includes an ultra-high-speed vitreous cutter, a brighter and safer light source, a user-friendly interface, and an open architecture. The open architecture is an exciting feature because with this design, the surgeon is able to use disposable instrumentation made by other manufacturers. Not only does this give the surgeon more choices, but it also puts pressure back on Bausch + Lomb to design disposables that surgeons will want to use with the Stellaris PC. The Stellaris PC is the only microincision dual-function platform available. The advanced technology allows for an easy transition between microincision cataract surgery (MICS) and transconjunctival sutureless vitrectomy (TSV).

ULTRA–HIGH-SPEED CUTTER

The cutter on the Stellaris PC can operate at speeds as high as 5000 cuts per minute (cpm). The ergonomics of the cutter are excellent. The microvit-style handle is made of a lightweight plastic that is color-coded for gauge size and has an optional extension feature for those surgeons who prefer a longer handle. The handle also has a tactile port indicator.

Table 1.

Ultra High-Speed Vitreous Cutter: Geometry

Dimensions of 23G cutters

	Stellaris PC	Alcon Constellation	MVE	Alcon Accurus
Port Width (in)	0.0214	0.0236	0.0221	0.0248
Port Length (in)	0.0185	0.0157	0.0189	0.0145
Port Depth (in)	0.0069	0.0082	0.0073	0.008
OD (in)	0.023	0.025	0.023	0.025
Port Distance From Tip (in)	0.0097	0.0097	0.0144	0.0095
Port Area (in^2)	0.000509	0.000486	0.000561	0.000504
Port Area (mm^2)	0.328	0.313	0.362	0.325
Tubing Length (in)	69	82	78	82
Outer needle length (in)	1.203	1.265	1.289	1.248
Cutter body length (in)	2.856	2.680	2.849	2.699
Handpiece weight (w/ o tubing) (grams)	4.89	5.7	5.44	4.15

For many years I used the electric Lightning high-speed cutter (Bausch + Lomb). I was comfortable with the size and weight of that handle, but there were many surgeons who were dissatisfied with the design, so many will welcome the more traditional size and shape of the Stellaris PC cutter.

High-speed 5000 cpm vitrectomy is currently state-of-the-art, and the ability to achieve this with a pneumatic cutter is a significant advantage. The geometries of the commercially available cutters are shown in Table 1. Note that the Stellaris PC and the Constellation cutters' ports are both 0.0097 inches from the tips of the cutters, which is important because a closer proximity of port to tip allows the surgeon to work more closely to the retinal surface. Also shown in Table 1 is that the port area on the Stellaris PC is larger than that on the Constellation (0.328 mm^2 vs 0.313 mm^2). In my opinion, this larger port area is an advantage because it allows vitreous to be removed more efficiently.

PREVIOUS-GENERATION CUTTERS AND FLOW

Approximately 10 years ago, I performed some studies on flow comparing the 25-gauge Bausch + Lomb electric

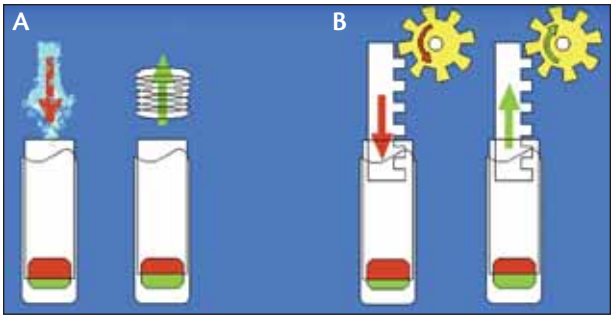

Figure 1. A traditional pneumatic cutter is closed by a pulse of air and opened by a spring (A) vs the electric cutter, which is driven back and forth by a gear mechanism and is actively closed and actively opened, similar to a sewing machine needle (B).

cutter and the Alcon pneumatic cutters. When high-speed cutting was first introduced by Bausch + Lomb, we observed that the electric cutter achieved maximum flow at its maximum cut rate, which was opposite to what we had been taught in our surgical training. The traditional pneumatic cutter achieved maximum flow at the minimum cut rate, with the cutter taking bigger bites of vitreous, which was consistent with the traditional teaching. We found, however, that at maximum cut rates, the electric cutter actually achieved 50% greater flow than the pneumatic cutter at the same maximum cut rate. This higher flow allowed for effective 25-gauge surgery using an electric cutter.

A traditional pneumatic cutter is closed by a pulse of air and opened by a spring (Figure 1A). The spring's mechanical properties are fixed and therefore always open the cutter at the same velocity. The electric cutter is driven back and forth by a gear mechanism and is actively closed and actively opened, similar to a sewing machine needle (Figure 1B). The faster the cutter closes, the faster it opens, allowing the port to remain open approximately 50% of the time, independent of cut rate.

At lower cut rates with the earlier-generation pneumatic cutter, a pulse of air closes the cutter and the spring opens it; the cutter pauses while it is waiting for the next pulse of air, and during that time, the port is open. High flow results because the port is open for a disproportionately larger amount of time. If one were to attempt to use an extremely high cut rate in this model, the pulse of air would close the cutter and the spring would begin to open it, but before the cutter could open, the next pulse of air would arrive to close it. As a result, the port is open for a small percentage of the duty cycle. Conversely, the electric cutter is driven in a sinusoidal pattern where it is open 50% of the time (a 50% duty cycle).

To compensate for the fact that their earlier-generation pneumatic cutter could achieve higher effective flow only at low cut rates, Alcon developed what was termed "3D" Dual Dynamic Drive. In 3D mode, as vacuum increased, the cut rate automatically decreased, allowing effective core vitrectomy flow, but with increased vitreous traction.

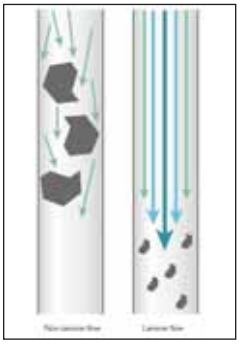

Figure 2. Large vitreous bites (left) in the aspiration line disrupt laminar flow and can mimic a high-viscosity fluid.

NEW-GENERATION PNEUMATIC CUTTERS

The Stellaris PC incorporates a next-generation pneumatic cutter with the advantages of the familiar lightweight microvit-style handpiece. With an optimized duty cycle, the port is open at least 50% of the time, even at 5000 cpm. Thus, we are able to employ ultrafast cut rates but with a duty cycle that allows for effective vitreous removal at the highest cut rates.

Poiseuille's Law is commonly involved in discussions of flow during vitrectomy. It describes, however, the behavior of ideal, homogenous fluids during laminar flow-in my opinion it does not accurately describe the behavior of vitreous. Vitreous is a complex viscous mixture, which may also contain bits of blood and tissue, and does not behave at all like an ideal fluid. Thus, at low cut rates, larger pieces of vitreous create resistance to flow as they travel down the lumen of the tubing. As cut rate increases, the pieces of vitreous are smaller and behave more like liquid (Figure 2). Essentially, the mechanical properties of what is moving up the tubing changes at higher cut rates. The 23- and 25-gauge cutters at 5000 cpm on the Stellaris PC produce vitreous flow that approaches that of a 20-gauge cutter. Using the lightweight pneumatic cutter and 5000 cpm with an optimized duty cycle allows surgeons to control flow simply and intuitively by varying vacuum with the footpedal.

VACUUM AND FLUIDICS

The vacuum on the Stellaris PC is controlled by an advanced algorithm that produces accurate, smooth, and linear aspiration that is accurate and predictable at low-end vacuum (as low as 2 mm Hg). Vacuum is robust and responsive-the Stellaris PC can achieve 0 mm Hg to 600 mm Hg in 1.5 seconds and dual vacuum lines can be switched on demand by the surgeon, putting more control into his or her hands.

The Stellaris PC uses either gravity or vented Air Forced Infusion (AFI), both of which produce stable, predictable fluidics. The pressurized bottle is more

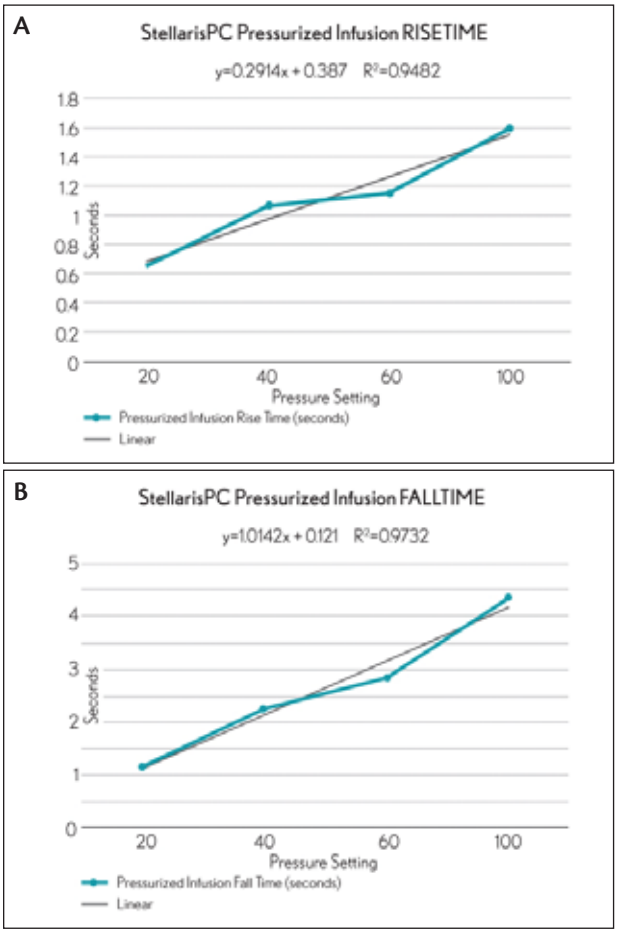

Figure 3. The Stellaris PC pressurized infusion rise time follows a linear path (A) as does the fall time (B).

responsive than an automated IV pole, allowing a surgeon to go from elevated infusion (60 mm Hg) to standard pressure (40 mm Hg) in approximately 0.5 seconds and the rise and fall times follow a linear path (Figure 3). The pump is independent and does not rely on wall air. Stellaris PC also has a power failure mode that maintains existing intraocular pressure (IOP). It does not, however, have any automated IOP control feature or measuring system. In my opinion, estimating IOP can be dangerously inaccurate-the only way to accurately measure real-time IOP is with a pressure transducer in the eye.

CLINICAL EXPERIENCE WITH CUTTING AND FLUIDICS

Our colleagues in Europe had access to Stellaris PC several months before those of us in the United States and the feedback has been excellent. Stanislao Rizzo, MD, has commented that the position of the port in all three gauges of the cutter offer exceptional quality in cutting and fluidics. The core vitreous can be removed quickly and the surgeon can work adjacent to the peripheral and detached retina with little retinal movement at 5000 cpm.

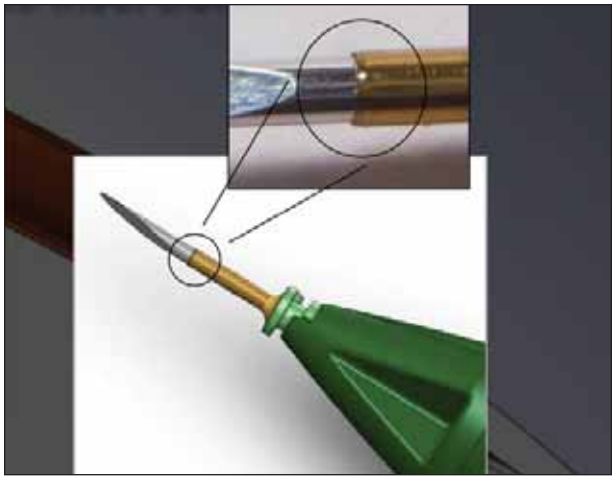

Figure 4. The cannula is slightly beveled, making entry into the eye even easier.

Figure 5. The illumination on the Stellaris PC has a dual light source and amber, yellow, and green filters that are switchable with the surgeon-controlled footpedal.

TROCAR/CANNULA ENTRY SYSTEM

The Stellaris PC has a new 23-gauge trocar/cannula Entry Site Alignment (ESA) design with a sharper blade that allows for outstanding wound architecture with less insertion force.

The ESA design continues to employ a polyamide cannula, which maintains better retention in the incision than a stainless steel cannula. The cannula is slightly beveled (Figure 4), making entry into the eye even easier.

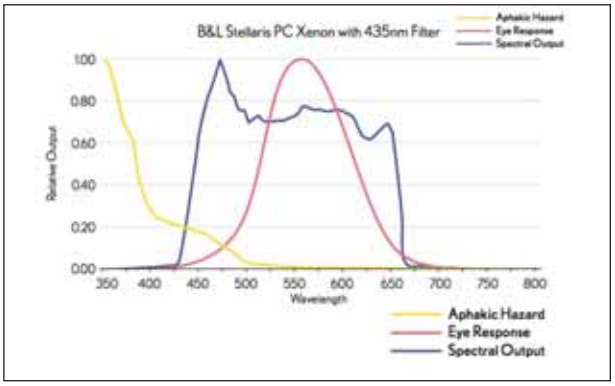

Figure 6. Xenon produces bright white light with a primary cut off filter of 435 nm.

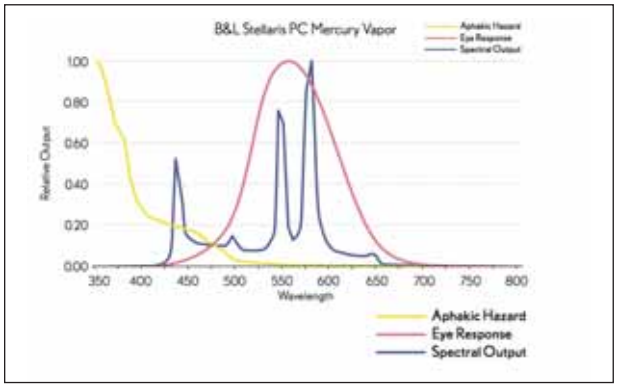

Figure 7. Mercury vapor offers increased safety for prolonged surgeries.

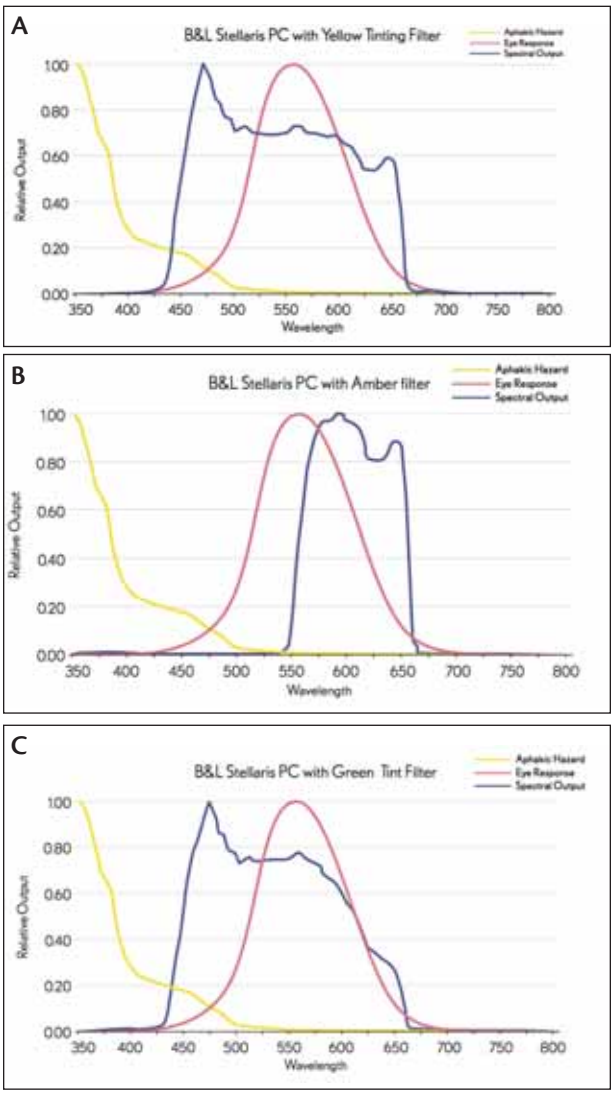

Figure 8. The xenon light source + yellow filter = 16% more safety (A); + amber filter = 118% more safety (B); and with green filter = equivalent safety (C).

ILLUMINATION

The illumination on the Stellaris PC is also highly advanced. First, the machine has a dual light source with both xenon and mercury vapor. Additionally, Stellaris PC has integrated color filters with amber, yellow, and green (Figure 5) filters that are switchable with the surgeon-controlled footpedal.

The xenon light source is "whiter" than mercury vapor with a cut-off filter of 435 nm and is familiar to most surgeons (Figure 6). For longer surgical procedures, the mercury vapor light is ideal to decrease the risk of prolonged exposure and phototoxicity (Figure 7).

We can alter the phototoxic hazards of light, however, using a filter. In terms of reducing phototoxicity, the amber filter is the most effective, with 118% more safety margin, the yellow filter is next with 16% more safety, and the green filter has the least effect at 10% increased safety (Figure 8).

Currently, there are no rules to guide us in the selection of color filters during vitreous surgery. However, many surgeons report that certain colors seem to enhance their ability to identify ocular structures during surgery. For example, some surgeons report that they can see the vitreous better under yellow light, while others report better visualization of membranes under green light. Also, research demonstrates that individual responses to light will vary greatly due to factors such as surgeon age and patient lens opacity.

FUNCTIONALITY AND VERSATILITY

The Stellaris PC is a compact and staff-friendly machine. The footpedal is wireless, which is greatly appreciated by my staff—one less cable to drag along the floor! I like the footpedal, as well, particularly because Stellaris PC allows me to use it for Dual-Linear control, meaning that I can independently vary vacuum and cut rate (or phaco power). It is particularly helpful when I am

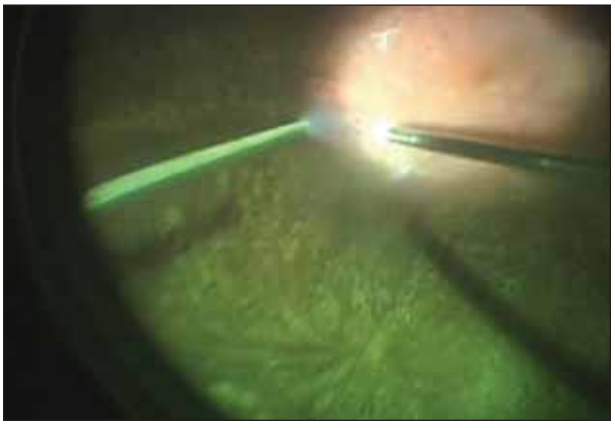

Figure 9. Chandelier lighting used for a diabetic vitrectomy.

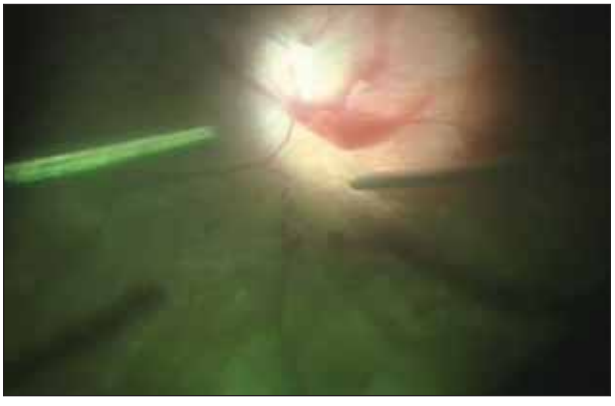

Figure 11. The reflux function on the Stellaris PC effectively blows the blood away from the retinal surface.

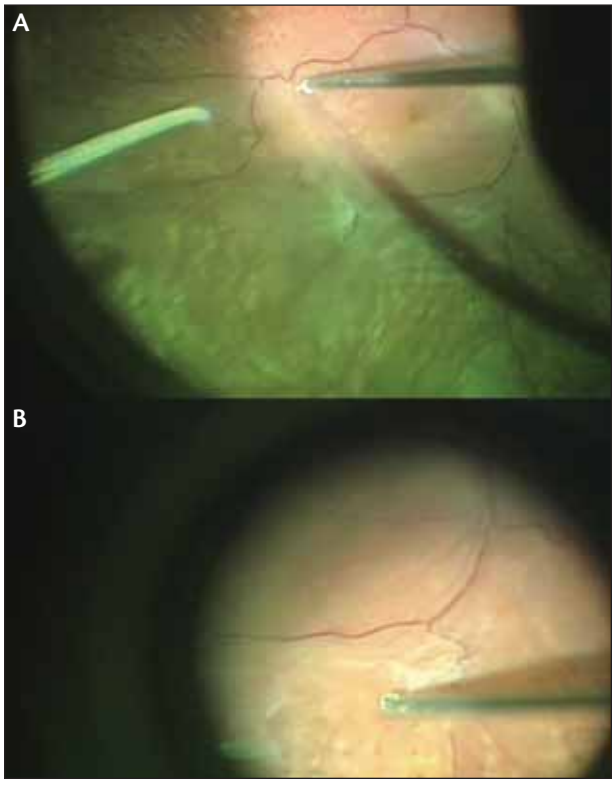

Figure 10. Using 5000 cpm enables safe shaving of scar tissue from the retinal surface with reduced risk of traction and retinal tear.

chasing after dropped lens fragments-I can engage the lens material, increase vacuum and then slowly increase frag power to consume the fragment without shooting it off the end of the port. It truly is an advantage to have the ability to control these and a multitude of other functions with the programmable wireless footpedal, which can store multiple surgeon settings.

The Stellaris PC screen interface is user friendly and does not have layers of menus to navigate. All parameters that require control during vitrectomy, cataract surgery, or combined cataract-vitrectomy are on one screen. Additionally, the screen is light adapting and it swivels, making it easy for the staff or surgeon to move it either toward them or away from them.

The Stellaris PC has many features that make setup easier for staff such as hands-free automatic priming, which frees the nurse or surgical scrub tech to attend to other tasks while Stellaris primes the cutter and the tubing.

FIRST CASE

The first week that the Stellaris PC was approved in the United States I had the opportunity to use it in my OR. My first 25-gauge case using this system was fairly straightforward and demonstrates its utility and functionality.

The patient was a younger monocular woman who with proliferative diabetic retinopathy and a tractional retinal detachment involving the temporal region of her macula. I prefer to use chandelier lighting for diabetic vitrectomy (Figure 9), and with the Stellaris PC's open architecture, I am able to use third-party disposables. I used the cutter at 5000 cpm to reduce traction and the risk of retinal tear. At this cut rate, I can shave the scar tissue from the retinal surface safely (Figure 10). The Stellaris PC has a reflux function that can effectively blow blood away from the retinal surface. In this case, no diathermy was needed (Figure 11).

The traction detachment involved an area of very thin and atrophic retina, so I chose to operate bimanually. With the chandelier in the mercury-vapor light source, I used a serrated pick in one hand and the cutter in the other. This allowed me to provide slight counter traction to safely dissect the fairly thick membrane from the atrophic retina (Figure 12). I find that being able to shield the retina a little bit with the pick is helpful, and the Stellaris PC cutter eliminates the need for scissors. I did

Figure 12. Thick membrane dissection.

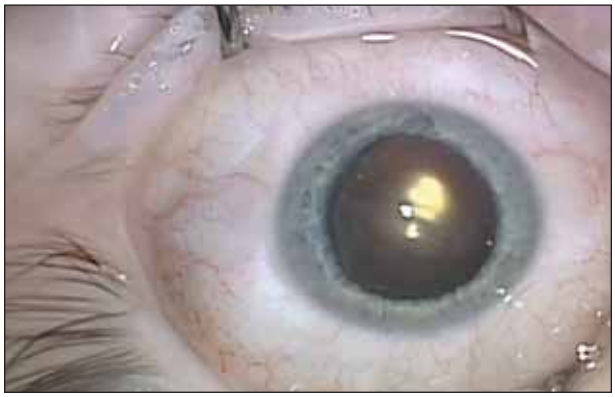

Figure 13. Self-sealing wound at the end of the case.

not induce any retinal breaks, but because of the traction, I applied laser and performed a fluid/air exchange at the end of the case.

The patient's eye was a bit soft after I removed the cannulas, so I had injected a small bubble of filtered air with a 30-gauge needle. If I feel that the eye is maintaining pressure well, I do not suture. If, however, a leak persists, I will open up the conjunctiva and suture. In this case, the eye maintained pressure nicely (Figure 13) and, indeed, her IOP was 18 mm Hg the day after surgery and the eye has done quite will since the operation.

SUMMARY

Since 2007, anterior segment surgeons have had access to the Stellaris, which has been considered a premier microincision cataract platform. The Stellaris PC merges the functions of cataract surgery with a vitrectomy system. In subsequent articles within this supplement to *Cataract & Refractive Surgery Today Europe*, Boris Malyugin, MD, discusses his use of the Stellaris PC for 1.8-mm MICS and Roberto Bellucci, MD, discusses the use of Stellaris PC for combined anterior and posterior segment procedures. ■

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Stellaris PC: State-of-the-art Technology for Cataract Surgery

The Stellaris PC and the C-MICS technique marry efficiency and better outcomes.

BY BORIS MALYUGIN, MD, PHD

I have been using the Stellaris (Bausch + Lomb, Aliso Viejo, CA) for coaxial microincision cataract surgery (C-MICS) since its launch in 2007 as my primary phacoemulsification system. The move to C-MICS with the Stellaris PC was natural, in my opinion. Decreasing incision size has been the trend in the history of cataract surgery, and with Stellaris PC, I routinely use a 1.8-mm incision. There was very little that I needed to change in my technique of handling a cataract when transitioning to C-MICS because the Stellaris PC has many useful features.

SAFETY, EFFICIENCY, AND EASE OF USE

The basic function of a phaco system is to break up a cataractous lens, commonly using ultrasound energy, and remove the fragments from the eye without decreasing the overall volume of the anterior chamber or damaging any intraocular tissue other than the lens.

Working with surgeons, the anterior functionality of the Stellaris PC system was designed with three goals in mind: safety, efficiency, and ease of use.

Safety. Safety includes the fluidics components of the Stellaris PC system. StableChamber Fluidics were developed to minimize surge and stabilize the anterior chamber. The fluidics systems were also made robust enough to balance fluid inflow and outflow—even through the smaller phaco tips required for MICS procedures. There is no surge after occlusion break using an 1.8-mm MICS needle and high vacuum settings (Figure 1).

Efficiency. Efficiency includes the elements of controlling cutting dynamics and power modulation including increasing stroke length of the phaco needle to improve mechanical cutting efficiency. The Attune energy management system allows the surgeon to customize all aspects of the ultrasound pulse to their technique and allows customized pulse duration and interval, while the Advanced Waveform Modulation allows variable wavefront duration and depth (Figure 2). The use of a 28-kHz frequency handpiece maximizes cavitation for enhanced nuclear emulsification and also eliminates the chance of thermal wound damage.

Ease of use. Ease of use includes improved interface and design features that ensure the system is simple and convenient to use for surgeons and OR staff alike. For example, the wireless footpedal is designed with an easy left/right offset for dual-linear mode. The footpedal controls power and vacuum, has an easy tension adjustment, is programmable, and is ergonomically designed. I use dual-linear for all my cases, which is helpful because I do not need to use multiple settings for the different steps in my surgery. For example, with other machines, a surgeon would need one setting for epinucleus, another for

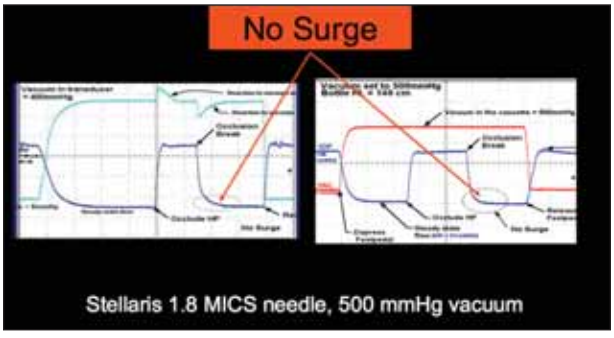


Figure 1. There is no surge after occlusion break using an 1.8-mm MICS needle and high vacuum settings.

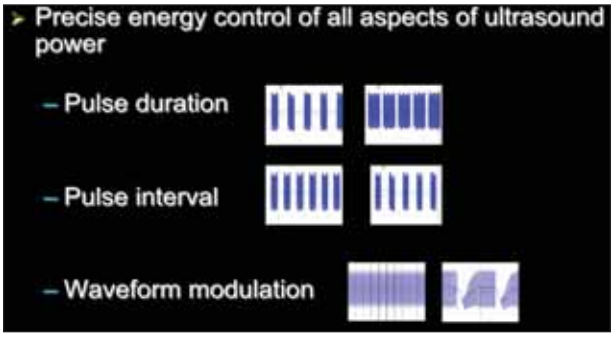


Figure 2. The Attune energy management system allows the surgeon to customize all aspects of the ultrasound pulse to their technique and allows customized pulse duration and interval, while the Advanced Waveform Modulation allows variable wavefront duration and depth.

Figure 3. The Akreos MICS IOL incorporates different haptic zones with an absorption zone that can adapt for the different capsular bag sizes and capsular contraction.

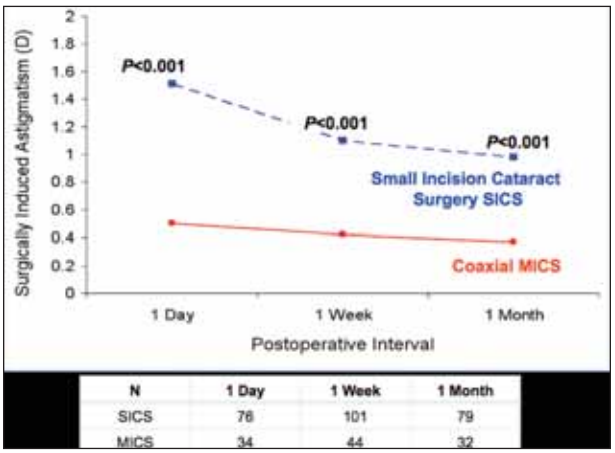


Figure 5. Performing a C-MICS procedure without enlarging the wound for IOL implantation has been shown to significantly reduce surgically induced astigmatism and increase visual recovery postoperatively when compared with small incision (2.8 mm) cataract surgery.

sculpting, and yet another for quadrant removal. With the Stellaris PC dual-linear footpedal control, I use only one setting.

For a quick chop technique, I most often use a linear ultrasound power of 30%, 80 pulses/s, and 50% duty cycle. My vacuum in ultrasonic phase is 400 mm Hg and the IV pole height is 100 cm. Although I use aggressive vacuum settings, the anterior chamber remains stable and the nucleus is effectively emulsified using vacuum-assisted ultrasonic aspiration of the lens. The stability of the chamber during the procedure can be gauged by pupil size as the fragment of the nucleus passes through the needle.

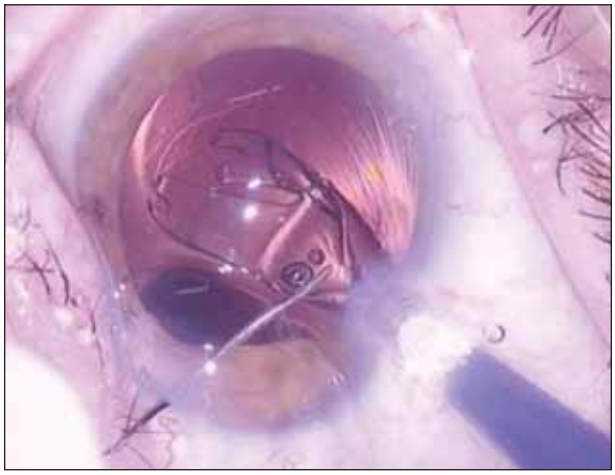


Figure 4. The injector stays outside the anterior chamber and the corneal tunnel is utilized as an extension of the cartridge.

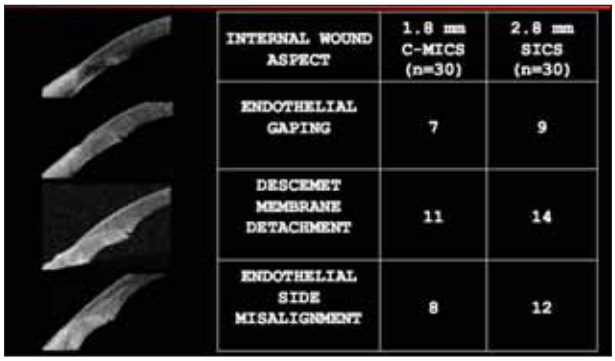
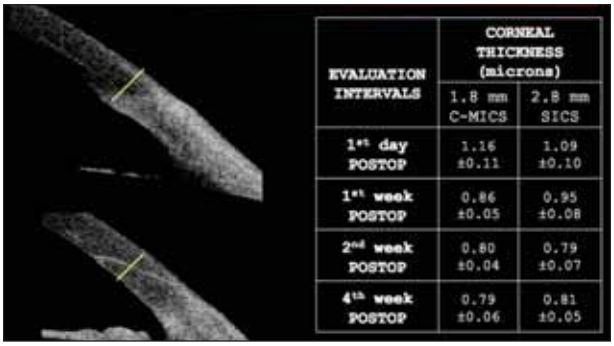


Figure 6. At 1 week, more eyes in the 2.8-mm group had endothelial gaping, Descemet membrane detachment, and endothelial side misalignment than those eye in the 1.8-mm group.

A COMPLETE MICS PROCEDURE

In my opinion, there is no reason to enlarge an incision to implant the IOL in a C-MICS procedure. I have been implanting the Akreos MICS IOL (Bausch + Lomb), which has an innovative design that incorporates different haptic zones with an absorption zone (Figure 3) that can adapt for the different capsular bag sizes and capsular contraction that occurs in the postoperative period in some of our patients. I use a linear injection wound-assisted technique to maintain the 1.8-mm incision and to reduce stress on the cornea during the IOL injection portion of the surgery.

In the linear injection wound-assisted technique, we use a corneal tunnel to inject the IOL. The injector stays outside the anterior chamber and the corneal tunnel is utilized as an extension of the cartridge (Figure 4). Corneal stress is minimized because we are not introducing the cartridge inside the wound—the internal



EVALUATION INTERVALS	CORNEAL THICKNESS (microns)	
	1.8 mm C-MICS	2.8 mm SICS
1st day POSTOP	1.16 ±0.11	1.09 ±0.10
1st week POSTOP	0.86 ±0.05	0.95 ±0.08
2nd week POSTOP	0.80 ±0.04	0.79 ±0.07
4th week POSTOP	0.79 ±0.06	0.81 ±0.05

Figure 7. The corneal thickness returned to normal values during the first week postoperative in the 1.8-mm group, but took longer in the 2.8-mm group.

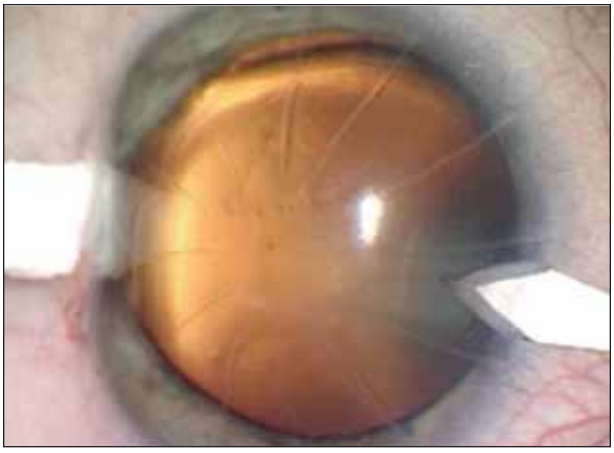


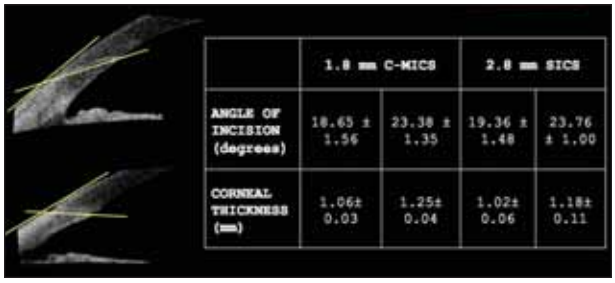
Figure 9. The 1.8-mm C-MICs incision fit well in between 12 incisions with no risk of incision enlargement or rupture during or after the procedure.

cartridge diameter (1.25 mm) fits to the linear incision size (1.8 mm).

Performing a C-MICS procedure without enlarging the wound for IOL implantation has been shown to significantly reduce surgically induced astigmatism and increase visual recovery postoperatively when compared with small incision (2.8 mm) cataract surgery (Figure 5).[1]

INCISION SITE STUDY

My colleagues and I performed a study to compare the structure of clear corneal incisions using 1.8-mm C-MICS procedure in 30 eyes vs standard 2.8 mm coaxial phaco in a second group of 30 eyes. We imaged the incision structure with anterior segment optical coherence tomography (Visante OCT; Carl Zeiss Meditec, Jena, Germany) and evaluated corneal thickness, incision length, and angle of incision at 1 day, 1 week, 2 weeks, and 4 weeks postoperative. At 1 week, more eyes in the 2.8-mm group had endothelial gaping, Descemet membrane detachment, and endothelial side misalignment than those eye in the 1.8-mm group (Figure 6). The corneal thickness returned to normal values during the first week postoperative in the 1.8-mm group, but took longer in the 2.8-mm group (Figure 7).



	1.8 mm C-MICS		2.8 mm SICS	
ANGLE OF INCISION (degrees)	18.65 ± 1.56	23.38 ± 1.35	19.36 ± 1.48	23.76 ± 1.00
CORNEAL THICKNESS (mm)	1.06± 0.03	1.25± 0.04	1.02± 0.06	1.18± 0.11

Figure 8. A sharper incision angle resulted in less trauma and corneal thickening at the wound site.

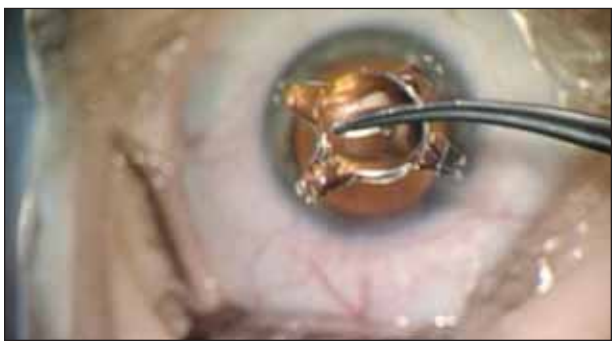


Figure 10. As the IOL is taken from its holder and placed in the transferring cartridge, the front and back of the IOL is easily identified.

We also observed that the angle of incisions is important. A sharper incision angle resulted in less trauma and corneal thickening at the wound site (Figure 8), supporting the theory that making longer tunnels provides more favorable outcomes.

CLINICAL CASE

I have used C-MICS with good results in a variety of complicated cases. An example of such as case is a woman who had a previous 12-incision radial keratotomy and a cataract associated with severe zonular weakness. The 1.8-mm C-MICs incision fit well in between 12 incisions with no risk of incision enlargement or rupture during or after the procedure (Figure 9). The capsulorrhexis was moving under the current of the irrigation aspiration, giving an idea as to the weakness of the zonular fibers. Because of this, I decided to proceed with a capsular tension ring to stabilize the bag and extend the equator. After stabilization, I implanted the Akreos MICS IOL. As the IOL is taken from its holder and placed in the

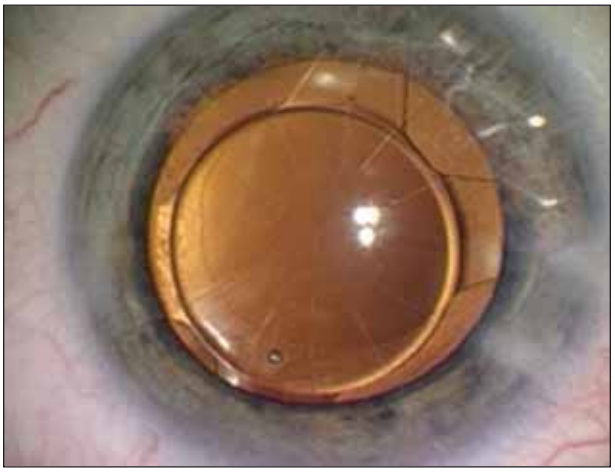


Figure 11. The Akreos MICS IOL in the bag.

transferring cartridge, the front and back of the IOL is easily identified (Figure 10). I used the wound-assisted technique to implant the IOL. Because of the excellent design of the Akreos, I only had to press lightly on the optic and the IOL was already in the bag (Figure 11). What is very good in this design is that you only have to slightly press on the optic and the lens is already in the capsular bag, obviating the need for special maneuvers for haptic implantation.

CONCLUSION

Why should we perform C-MICS with the Stellaris PC? First, we can use small incisions without changing our preferred technique. Smaller incisions are better because they promote less surgically induced astigmatism, less trauma and inflammation, leading to faster visual recovery.[2] Second, C-MICS results in a high level of chamber stability. We can use high vacuum settings without compromising chamber stability, while maximizing the holding force to make emulsification more effective. C-MICS provides optimal wound protection around the sleeve and induces no leakage during or after the surgery. The thinner needle penetrates more easily into hard cores and in cases of small pupils, the ability to visually monitor the process is enhanced. Finally, C-MICS can be used effectively and safely for more complicated cases.

In my opinion, it is clear that advanced technology, such as the Stellaris PC, promotes an ongoing amalgam of efficiency and improved outcomes for both anterior and posterior surgeons. ■

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Stellaris PC: Advanced Capabilities for Combined Procedures

Surgeons no longer need two systems to perform both cataract and vitrectomy surgeries at the highest level.

BY ROBERTO BELLUCCI, MD

Since the Stellaris was introduced in 2007, those of us who perform phaco surgery have benefited from the optimized phaco power, separate control of ultrasound and vacuum, excellent control of fluidics, the dual linear foot pedal, and of course the 1.8 mm microincision. With microincision cataract surgery (MICS), we can provide our patients with a safer self-sealing incision that results in less trauma to the eye during surgery and faster healing postoperatively. For some time, Bausch + Lomb has been developing the new vitreoretinal surgery component for the Stellaris, and the result is the Stellaris PC. PC stands for Procedural Choice. The Stellaris PC is by itself an elegantly engineered system with multiple features to improve our posterior segment surgeries, including but not limited to an ultra–high-speed pneumatic vitreous cutter, advanced illumination with three-color filters, and an easy-to-use interface.

Because I perform many combined anterior and posterior segment surgeries in my practice, what I appreciate most about the Stellaris PC is that the features that I enjoy for phaco surgery actually enhance my ability to perform vitrectomy.

FEATURES ON THE STELLARIS PC

It is true that many patients who require cataract surgery have retinal comorbidities such as epiretinal membranes, macular holes, diabetic retinopathy, and retinal detachment. These problems can be solved by combining MICS and posterior transconjunctival sutureless vitrectomy (TSV). Because MICS does not impair the cornea, I have a better visualization of the retina for the posterior portion of the surgery. Additionally, the 1.8 mm MICS incision does not leak during vitrectomy and the intraocular lens stays well positioned after posterior surgery is complete.

The redesigned Venturi pump system offers excellent fluidics control for both MICS and TSV and I am able to use lower pressure on infusion. This is particularly important during cataract removal after I have inserted the trocar for the vitrectomy procedure, because the lens diaphragm will not be pushed backward. The combined procedure disposable packs allow an easy transition from anterior to posterior segment surgery.

The 5000 cpm on the cutter of the Stellaris PC reduces the traction on the retina, and because the

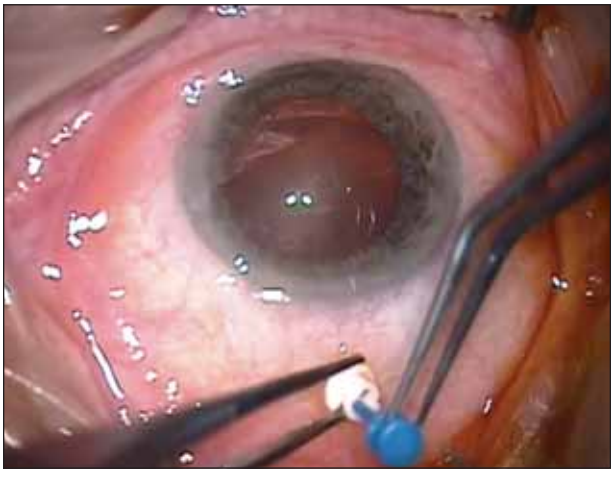

Figure 1. A one-step solid trocar is inserted at the beginning of a combined case.

Figure 2. Phaco through 1.8-mm incision on a brunescent cataract.

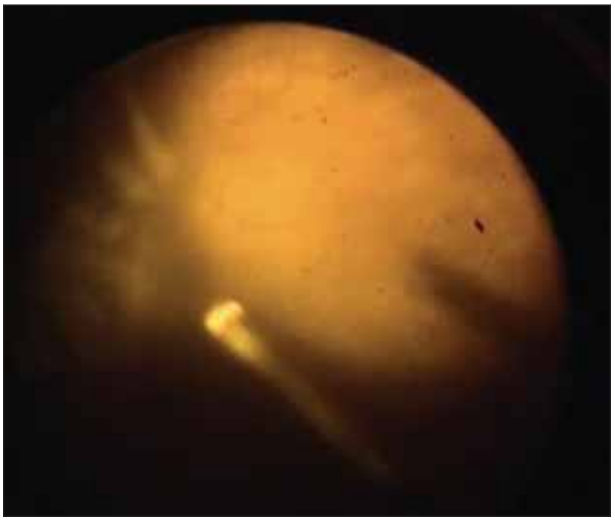

Figure 3. The amber filter is used to reduce the glare from triamcinolone acetonide.

port has been designed to be closer to the tip of the needle, I can safely bring my cutter closer to detached retina than was allowable with the Millennium Microsurgical System (Bausch + Lomb). In addition, the high-speed vitreous cutting will fragment the vitreous into very small pieces, thus giving the aspirated fluid the characters of Newtonian fluids. Ergonomically speaking, the handpiece has been designed with a longer handle, increasing surgeon comfort.

The Stellaris PC provides both xenon and mercury lamp types and the three available color filters improve visualization of vitreous for removal. The dual independent lamps have been designed to eliminate phototoxic wavelengths.

The new 23- and 25-gauge disposables allow easier insertion of the trocars and smoother surgery. The new disposable forceps are designed to grasp the membranes with strength and precision and pull them with the proper force.

CASE EXAMPLES

In the first combined case that I performed with the Stellaris PC (Figure 1), the patient had a dense cataract (Figure 2) and an epiretinal membrane (ERM). The Venturi pump was particularly helpful for this scenario because the fluidics kept the chamber stable. The phaco procedure was smooth and I only had to raise the bottle to 60 cm and use 10% maximum ultrasound power. After implanting the IOL through the 1.8-mm incision, I made an easy transition to the posterior segment. I stained the membrane with triamcinolone acetonide and used an amber color filter to minimize the white color of the drug and to see the central vitreous on

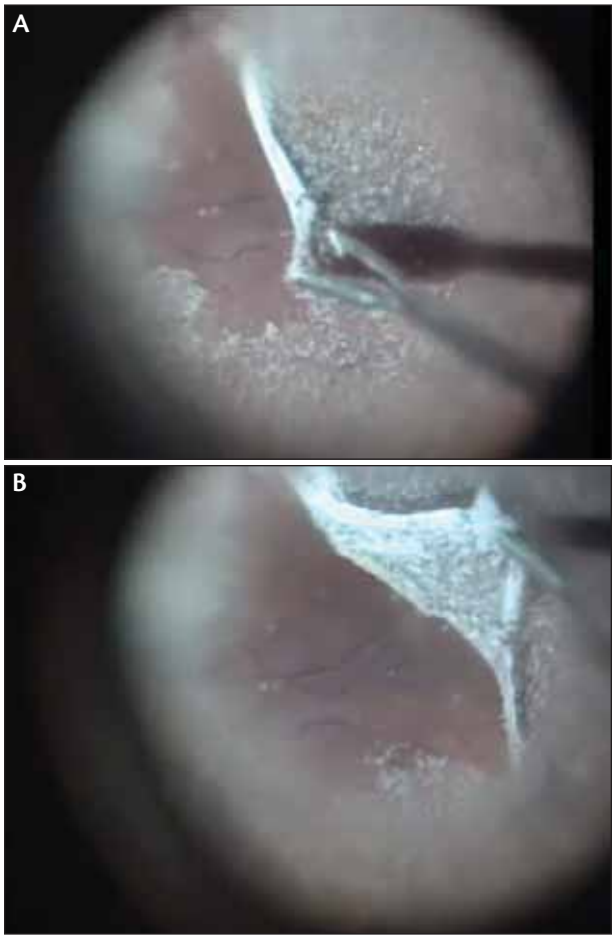

Figure 4. The ERM is lifted with 23-gauge disposable forceps (A) and gently removed (B).

Figure 5. Silicone oil is put into the posterior chamber as tamponade for a macular hole case.

removal (Figure 3). I removed the diabetic membrane with the new Bausch + Lomb 23-gauge disposable forceps (Figure 4) and for the internal limiting membrane (ILM), I used Brilliant Peel (Fluoron, Ulm, Germany); with

this dye and the light source on the Stellaris PC, the ILM can be safely and easily removed using Tano forceps. After ILM removal, I removed the remaining central membrane material.

To perform every type of sutureless vitreoretinal surgery we use the 23-gauge set of instruments, which make posterior vitreous detachment easy. With 23-gauge, I find it easy to remove the ERM and ILM. Using 5000 cpm and the excellent fluidics control on the Stellaris PC, I can approach the retina for careful vitreous removal. The viscous fluid pump allows us to use silicone oil internal tamponade for macular hole (Figure 5).

The same 23-gauge approach is preferred for retinal detachments, when it is very important to match fluidics and cutting for close retinal work.

SUMMARY

In my opinion, the Stellaris PC is the first truly complete combined surgical platform and has become my most effective partner in surgery. The machine has features that make the transition from the anterior segment to the posterior segment extraordinarily smooth in terms of safety and efficacy, so surgeons no longer need two systems to perform both surgeries at the highest level. The posterior segment surgeon will find in the Stellaris PC the best partner for advanced vitreoretinal surgery, without the need for a second machine for advanced cataract surgery. ■

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