

My Preferred Phaco Platform

Three surgeons discuss their phaco devices.



The WhiteStar Signature

BY SUMIT "SAM" GARG, MD

As a user of the WhiteStar Signature System (Abbott Medical Optics Inc.) for the past 6 years, I greatly appreciate its flexibility, which allows me to maximize efficiency without compromising patients' safety.

DUAL-PUMP OPTIONS

This is the only system available in the United States that combines elliptical (nonlongitudinal) motion of the phaco tip with dual-pump capability, and I routinely use both peristaltic and Venturi modalities in every case. A peristaltic phaco pump is the most common today, because most surgeons are trained on systems with this kind of technology and are thus extremely comfortable using it. Peristaltic fluidics is flow based and controlled by the rise time. Vacuum is created upon occlusion, providing excellent holdability of the nucleus. I generally begin phacoemulsification in this mode by impaling the nucleus and then holding it in place with the handpiece while I maneuver the chopper around the side for a horizontal technique.

Venturi fluidics is vacuum based and more dynamic. The constant motion quickly draws nuclear segments to the tip of the handpiece, thereby enhancing followability and improving the efficiency of nuclear fragment removal, cortical cleanup, and viscoelastic removal. It is my opinion that Venturi fluidics increases the safety of fragment removal, because the improved followability allows me to keep the handpiece near the middle of the eye while the nuclear segments come to me, so I need not "fish around" for fragments near the capsule. I find that the Ellips FX handpiece (Abbott Medical Optics Inc.) allows me



to remove fragments efficiently through its elliptical tip motion, which decreases my need for phaco energy. Using linear foot pedal control of the vacuum in Venturi mode lets me polish the capsule without employing a separate setting. Venturi fluidics is also ideal for surgeons who are performing laser cataract surgery. The nuclear quadrants that are created by the laser move effortlessly to the phaco tip, greatly expediting quadrant removal.

The lack of occlusion, however, means that the aspiration rate is very fast; unintended objects could also be brought to the tip very quickly, so it is important to exercise caution. For this reason, using peristaltic mode in the eyes of patients with compromised zonules or for the last nuclear fragment would be safer. Having both pump modalities on one machine allows me to strike a balance between high safety for patients and surgical efficiency.

The Whitestar Signature makes it easy for surgeons who have more experience with peristaltic systems to experiment with Venturi vacuum, because both pumps are accessible from the same cartridge. During a given case, surgeons can seamlessly switch back and forth from one vacuum mode to the other.

FLUIDIC CONTROL

Maintaining a stable chamber is essential during cataract surgery, and fluid inflow must balance the expected outflow created by would leakage and the aspiration rate. I find that this phaco platform's fusion technology helps to maintain the IOP by anticipating occlusion and preemptively adjusting the vacuum before the occlusion breaks. Surge protection facilitates high vacuum and flow rates, reducing overall phaco time. In addition, the responsive fluidic environment helps to draw cortical material to the tip while maintaining



chamber depth and stability.

The computer automatically sets the fluidics, but the surgeon has the option of personalizing them. As the user gains experience with the system, he or she can tweak the settings to maximize efficiency. I recently switched from a continuous power setting in Venturi to a pulsed mode. Switching the duty cycle reduced my use of phaco energy without sacrificing my efficiency. I hope that lower overall energy usage will generate less endothelial trauma and drop-off, speeding the patient's recovery and decreasing the risk of future complications.

CUSTOMIZATION

The WhiteStar Signature System gives surgeons an enormous amount of flexibility. The elliptical motion allows them to use their preferred tip configuration—straight or curved. Additionally, being able to switch on the fly between pump modes allows surgeons to capitalize on the benefits of both without having to choose one. I find these attributes important when teaching cataract surgery. Early in the academic year, I have residents remain in peristaltic mode for the entire case. Once my residents have sufficient experience, I expose them to the efficiency of the Venturi pump.

Surgeons can feel completely confident with the automatic fluidic settings or customize them to their individual technique. The advances provided by this unit have enabled me to improve my clinical results. Since transitioning from peristaltic-only to “fusion” phacoemulsification (peristaltic and Venturi combination), I feel I have achieved greater safety, efficacy, and efficiency in all of my cataract cases, routine and complex.

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The Stellaris PC

BY LOUIS D. “SKIP” NICHAMIN, MD

For anterior segment surgeons, it is no longer acceptable simply to extract a patient's

cataract and repair the problem at hand. Rather, ophthalmologists must now deliver high-quality vision—oftentimes better than what was present prior to the development of the cataract. Microincisions, advanced fluidics, and refined refractive outcomes are allowing us to achieve this level of success not only in routine cases but even in challenging and complex eyes. Advanced fluidics is taking on a new meaning in the age of femtosecond laser cataract surgery, and at no time is this consideration more important than during complex surgery on high-risk eyes such as those with floppy iris syndrome or during combined glaucoma or vitrectomy surgery. As a refractive cataract surgeon who handles complex referral cases, I favor the Stellaris Procedural Choice (PC; Bausch + Lomb) for its state-of-the-art pump technology, its efficiency in the OR, and its ability to afford me the smallest possible microcoaxial incision size. I am a huge proponent of microincisional cataract surgery (MICS), as I believe a smaller incision always leads to better visual outcomes and permits surgeons greater control over the intraocular milieu.

The Stellaris PC also combines an ultrahigh-speed vitrectomy cutter, stable vacuum-based fluidics, and a bright (safe) light source with a dual-function platform, so when dealing with complicated cases, the surgeon has the most sophisticated machine at his or her fingertips.

DESIGN DETAILS

The Stellaris PC is an advanced microsurgical system that was specifically designed to reduce the size of the incision, to improve the fluidic balance between aspiration and infusion forces, and to optimize the delivery of modulated ultrasound energy. Other distinct advantages are that the unit's design allows sleeveless biaxial techniques—popular internationally—and that it will let the surgeon opt for traditional coaxial techniques if preferred.

The vitrectomy cutter on the Stellaris PC is particularly useful both in planned vitrectomy and when a posterior capsular rupture occurs.

The platform's stable chamber fluidics combined with the vacuum-fluidics module minimizes surge and promotes a stable anterior chamber by balancing fluid inflow and outflow through small phaco tips and high vacuum settings of up to 600 mm Hg. The outflow stability is enhanced by a micromesh filter and resistive tubing that help to reduce clogging of the aspiration line. The versatility of this system became apparent in my practice where several different surgeons use the unit; we can each customize the system based on our preferred fluidics.

During phacoemulsification, the digi-flow system allows higher rates of steady, uninterrupted “active” infusion to balance out the higher vacuum settings typically used in MICS. A comparative case series found that 76% of surgeons had more stable chambers with this system than with the traditional gravity feed.¹ The Stellaris PC was the first to market with this type of active and controlled infusion technology, and I could not imagine operating without it.

ENERGY USE

Minimizing phaco energy has been a goal of cataract surgeons, and the use of a femtosecond laser to perform some aspects of the cataract procedure may reduce the energy needed during phacoemulsification. With the Stellaris PC, surgeons can manipulate the ultrasound pulse (including both duration and interval) and make use of a variable wavefront duration and depth. In my experience, finding the perfect match among these parameters improves the followability of nuclear fragments, reduces the heat generated, and, therefore, increases phaco efficiency.

FOOT PEDAL USE

What I have found particularly helpful is the foot controller. On the Stellaris PC, there are four programmable buttons combined with a center foot pedal. Because of the way the foot pedal operates with both up-and-down and side-to-side travel, it can control two user-selected linear functions simultaneously. The foot pedal uses wireless technology (but can still be connected via a physical cable if necessary or warranted).

COMBINED CASES

Thankfully, posterior capsular ruptures are few and far between, but anytime anterior segment surgeons need to perform advanced vitrectomy, the more efficient their devices are, the safer the procedure is for the patient. The Stellaris PC features high cutting rates that produce smaller vitreous bites that behave more like a low-viscosity fluid. The cutters (23 and 25 gauge) can approach the efficiency of a 20 gauge at their highest cutting rates. Of particular importance to me during these combined procedures is that turbulence is reduced at the higher cutting speeds, because the smaller bites of vitreous are removed with each cut so the smaller changes in volume per time period result in greater stability.

Finally, the Stellaris PC has dual independent filtered lamps that permit differentiated viewing—a major benefit during vitrectomy. The colored filters on the system allow me to use yellow light to protect

the retina, green to peel the membrane, and amber to better visualize the peripheral vitreous.

CONCLUSION

The Stellaris is not only my preferred phaco system for standard, uncomplicated cataract surgery. It is also my go-to system simply because of its versatility and ability to help me if and when complications occur or when I am planning a complex surgery.

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1. Wallace RB. Evaluation of a pressurized infusion system to replace or augment gravity feed of fluid during cataract surgery. Paper presented at: ASCRS Symposium on Cataract, IOL and Refractive Surgery; April 2010; Boston, MA.



The Centurion Vision System

BY STEPHEN S. LANE, MD

Historically, phaco systems have employed two different types of pumps: peristaltic and Venturi. Each has positive and potentially negative attributes. The main advantage of a Venturi-based system is the instrument’s rapid response. In return for that responsiveness, however, surgeons have had to give up some degree of safety, because there is no way to independently set flow rates. Because flow is related to the vacuum level everything occurs more quickly. This may leave less time for the surgeon to react. It is no surprise, then, that the ability to independently set flow allows the surgeon to slow down the procedure, thereby potentially increasing the safety of peristaltic pumps but at the expense of being less responsive. During the past 7 years, manufacturers have modified these technologies by allowing alteration of Venturi pumps to slow them down and to peristaltic pumps to make them more responsive. Today, peristaltic pumps can be set to behave more like Venturi devices and vice versa. With the Centurion Vision System (Alcon Laboratories, Inc.), there is now a total evolution of pump technology.

ACTIVE FLUIDICS

One of the key features of the Centurion Vision is what the company calls *active fluidics*. This technology allows the surgeon to match the system’s inflow and outflow. When outflow exceeds inflow, the chamber can become shallow. Active fluidics detects this imbalance and compensates dynamically throughout the

entire procedure to maintain a stable anterior chamber by establishing a consistent IOP. The Centurion requires no bottle of irrigation fluid, as irrigation is “active,” meaning that irrigation is controlled and managed by the surgeon and Centurion, not gravity. Previous generations of phaco machines have been dependent on a gravity-fed system wherein the higher the bottle was placed, the more flow was generated. The Centurion uses an active feedback process, and instead of a bottle, a bag (like an intravenous bag) of irrigation fluid is utilized. This bag slips into a slot in the machine between two plates, and the plates squeeze the bag, generating more flow as the plates compress the flexible bag. With the dynamic feedback system, a sensor detects the pressure inside the eye, and the machine squeezes the bag to a greater or lesser extent to maintain active inflow that will match the outflow to reach the IOP desired and set by the surgeon. The phaco unit will steadily maintain the IOP set by the surgeon, which reduces turbulence (chatter) and improves efficiency and followability inside the eye during phacoemulsification and I/A and provides tremendous safety by virtually eliminating surge as the anterior chamber remains rock solid. In my experience, this level of efficiency and safety is unprecedented compared to previous technologies.

BALANCED ENERGY

The Centurion features a new Intrepid Balanced Tip allowing for more efficient and safer energy distribution. This unique tip has been specifically designed to maximize torsional movement at its distal end while minimizing movement proximally at the incision. In this way, the greatest energy and heat are employed at the tip where they are needed the most and minimized along the shaft to lessen incision burns and the opportunity for changes in the wound's configuration.

Many ophthalmologists prefer a straight tip to the Kelman-style tip, and they will find this design to be very ergonomic.

APPLIED INTEGRATION

The third major feature of the Centurion is its applied integration. Working with the cataract suite, the Centurion Vision System is integrated with the Luxor microscope and allows the user to employ the wireless phaco foot pedal to advance through each step of the procedure. The device works with the digital overlays from the manufacturer's Verion Image Guided System such that the heads-up display can be viewed on the Centurion or the surgeon can simply view the information and surgical field through the heads-up display in the microscope.

CONCLUSION

The Centurion Vision System, optimizes every moment of the cataract removal procedure and redefines what a phaco system does. I can now run vacuum levels of 600 mm Hg with a flow rate of 60 mL/min, with no issues of surge and with stable anterior chamber depths, which is unprecedented. Building on the advances noted herein, the Centurion provides a more efficient and safer way to perform phacoemulsification, which I believe will improve patients' outcomes. ■

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