R-EVO SMART: FUSING PERFORMANCE AND FUNCTIONALITY IN A COMPACT SYSTEM

Designed for cataract and vitreoretinal surgery, this device features Agile Fluidics and proprietary Minimal Stress Technology.

BY TOMMASO ROSSI, MD; AND ROBERTO BELLUCCI, MD

The recently launched R-Evo Smart (Beaver-Visitec International) is available in three models, the R-Evo Smart E (Peristaltic Pump), R-Evo Smart S (Dual Pump), and R-Evo Smart CR (Dual Pump). The CR has the key traits of a dual-function system and gives cataract surgeons access to perform vitreoretinal procedures. All three R-Evo Smart models incorporate two distinctive features: Agile Fluidics, a fusion of solutions that act synergistically to achieve continuous excellent anterior chamber stability, and proprietary Minimal Stress Technology to optimize ultrasound energy delivery.

AGILE FLUIDICS

BY ROBERTO BELLUCCI, MD

I have used a multitude of phaco systems, but the R-Evo Smart stands out for its performance, reliability, ease of use, and intuitive graphical interface, all in a compact design.

The three distinctive elements characterizing R-Evo Smart Agile Fluidics are the high-efficiency pumps, the dual-infusion modality, and dynamic IOP control, which limits sudden anterior chamber fluctuations during postocclusion break.

Peristaltic and Venturi pumps. R-Evo Smart is equipped with a modern flow-based peristaltic pump that allows faster and smoother rotor action, activated by a stepper motor. The peristaltic pump features roller rotors specifically designed to reduce pump pulsation. Moreover, dual-pump systems incorporate a vacuum-based Venturi pump, allowing surgeons to transition between Venturi and peristaltic pumps depending on their preferences and the specific requirements of the procedure.

Dual-infusion modality. With the R-Evo Smart, the surgeon can choose between a traditional integrated, programmable, gravity-fed IV pole infusion and advanced microprocessor-controlled active infusion. The latter provides faster reaction time to compensate for IOP fluctuations at varying aspiration flow rates. This can alleviate intraoperative issues related to anterior chamber instability.

Dynamic IOP control system. The dynamic IOP control addresses sudden IOP fluctuations that occur during postocclusion break. It stabilizes the anterior chamber and mitigates surge intensity and duration to balance inflow and outflow (Figure 1).

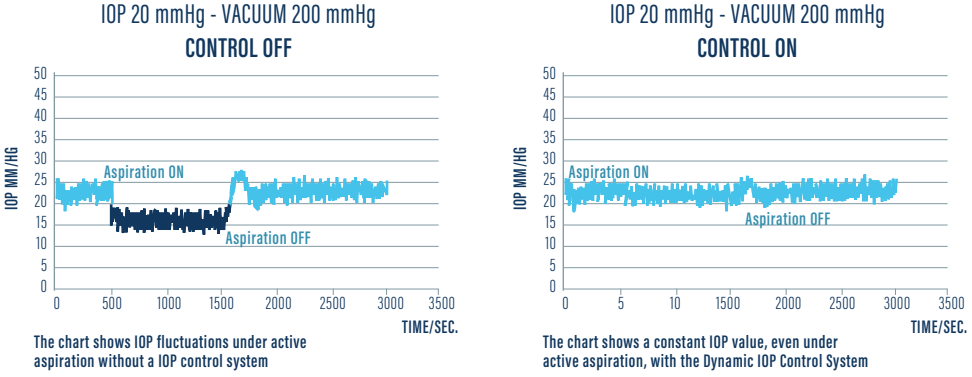

Figure 1. IOP fluctuations under active aspiration without an IOP control system (left). With the dynamic IOP control system, the IOP value is constant (right).

PERSONAL EXPERIENCE

I've used the R-Evo Smart in standard cataract surgery and in laser cataract surgery. What I immediately noticed with the Venturi pump and the advanced microprocessor-controlled active infusion, as soon as I pressed the footpedal, the anterior chamber pressure increased as more vacuum was given. The rapid response of the system helps to compensate for any shallowing of the anterior chamber.

With the R-Evo Smart, as the aspiration increases in response to the increased vacuum, the anterior chamber stays incredibly stable. This system compensates for anterior chamber pressure far better than other Venturi pumps I have experience using and, in my opinion, better than peristaltic pumps. During occlusion, however, there is no aspiration flow and the IOP increases. The R-Evo Smart's dynamic IOP control helps to regulate the infusion pressure and thereby maintain a consistent IOP level. I did not have to worry about sudden increases in IOP when using this technology.

The combination of the three key Agile Fluidics elements makes the R-Evo Smart a valuable device. It avoids both pressures shallowing inside the anterior chamber and excessive pressure during occlusion.

The R-EVO smart technology is useful in every eye. However, it is particularly useful in highly myopic eyes because those eyes typically have intervals of increased IOP during surgery.

I can set the irrigation pressure as low as 30 mm Hg, which is a lower pressure than that I am accustomed to working with. This will not only decrease the fluctuations in the anterior chamber but also limit the amount of irrigating saline solution inadvertently moving into the vitreous.

Besides having probably one of the best systems for infusion control I have ever experienced in a phaco machine, the R-Evo Smart also has a specific delivery mechanism for the ultrasound energy, Minimal Stress Technology, described by Professor Rossi below.

CONCLUSION

The R-Evo Smart adds safety and flexibility to our cataract surgery procedures. The versatility and design of the device gives me access to meaningful innovations, such as Agile Fluidics and Minimal Stress Technology, so that I can provide my patients with the safest, most effective procedure possible, with reduced postoperative recovery time.

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A NEW SYSTEM FOR REDUCING INTRAOCULAR STRESS

BY TOMMASO ROSSI, MD

A key indicator of my surgical efficiency is day 1 postoperative cornea transparency. R-Evo Smart includes the proprietary Minimal Stress Technology, a feature that monitors phaco tip movement during surgery to optimize ultrasound energy delivery to the eye.

The elongation of the phaco tip during phaco sculpt and quadrant removal introduces ultrasound energy and therefore stress into eye tissues. The R-Evo Smart Minimal Stress Technology works in the background to maintain consistency between the programmable phaco tip stroke and the actual tip elongation, when the phaco tip faces the resistance opposed by cataract material (Figure 2).

Minimal Stress Technology is characterized by monitoring and sensing the dumping of the phaco tip stroke under the resistance of the lens material; transmitting continuous feedback related to the actual tip movement; and adjusting energy supply to the piezoelectric components of the phaco handpiece to align actual tip elongation to the value the surgeon has programmed.

Why is this important? With other systems, surgeons must compensate for the actual and programmed tip elongation by reprogramming the equipment with higher energy levels. However, when the tip is not facing significant resistance from cataract material, activation of ultrasound causes excessive dissipation of energy into the anterior chamber. This eventually results in iris inflammation, endothelial cell damage, and corneal decompensation.[1-3] Minimal Stress Technology ensures consistent phaco tip elongation while reducing unnecessary dispersion of ultrasound energy in the eye.

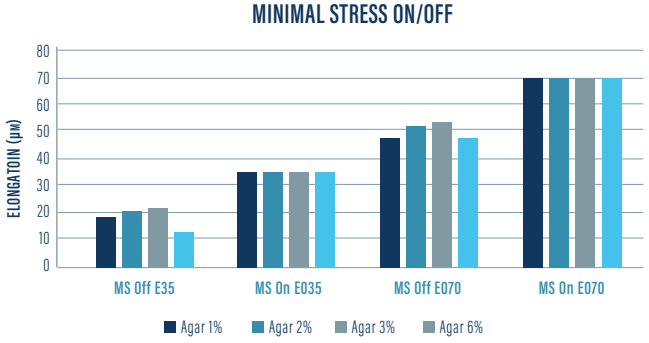

Figure 2. Actual tip elongation in sculpt phase, with feedback control on and off when nominal elongation was programmed by the surgeon at 35 µm (E35) and 70 µm (E70). The dark blue, light blue, gray, and teal bars indicate increasing agar gel percentage, mimicking the increasing hardness of the cataract material.

CLINICAL EXPERIENCE, ADVANTAGEOUS IN ALL SURGERIES

In a very tough, hard nuclei, for instance, it is common to experience an efficiency loss due to reduced phaco tip elongation under cataract resistance. Further, phaco tip elongation will need to be adjusted more often in a hard, mature cataract than is typically required in a less mature cataract. With Minimal Stress Technology, however, the mismatch between programmed and actual tip elongation under cataract material resistance is unlikely to happen. In our experience, the amount of energy dissipated into the eye can be reduced by as much as 20% to 30% with Minimal Stress Technology.[4]

Although the surgeon may or may not be completely aware of what's going on—because it's too refined for the surgeon to feel—he or she will undoubtedly see the results in terms of reduced inflammation and increased efficiency.

Using this technology is beneficial in all grades of cataract and in all types of cases. It helps the surgeon to perform safer, more efficient surgery with decreased risk for surgical complications like iris inflammation, endothelial cell damage, and corneal decompensation. And it maximizes the opportunity for our patients to experience faster visual recovery and to achieve excellent outcomes. ■

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