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Key Insights: CENTURION with ACTIVE SENTRY Handpiece and INTREPID Hybrid Tip

Designed to Deliver Safety
and Performance

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Fluidics Control in the Palm of Your Hand

With a built-in pressure sensor, the Active Sentry Handpiece can boost safety and efficiency while solving persistent challenges.

BY KEVIN M. MILLER, MD



In the last decade, technologies have raised the safety and predictability of phacoemulsification to new heights. Alcon Laboratories equipped the CENTURION Vision System (Alcon) with ACTIVE FLUIDICS technology (Alcon) to overcome the problems associated with variable infusion and aspiration rates that affect intraocular pressure (IOP). This technology was the first to replace traditional gravity-based phaco fluidics with a system that compresses a bag of balanced salt solution to overcome infusion line resistance as aspiration flow from the eye varies. Surgeons can expect ACTIVE FLUIDICS technology to sense and respond to any changes in IOP very quickly and effectively, making the anterior chamber more stable.

Now, ACTIVE FLUIDICS technology has been made even more responsive with the addition of the ACTIVE SENTRY Handpiece (Alcon), which contains an integrated pressure sensor. Previously, pressure alterations at the tip of the phaco probe traveled to a sensor near the cassette at the speed of sound. Now, the ACTIVE SENTRY Handpiece measures IOP very near the tip, eliminating that millisecond delay in adjusting the fluidics. A redesigned valve is more responsive as well, and ACTIVE SENTRY software for the CENTURION platform helps ensure the process is seamless.

In helping to develop the ACTIVE SENTRY Handpiece, I was excited that locating the sensor in the handpiece would also eliminate the persistent problem of setting the patient eye level (PEL). To calibrate the fluidics accurately in any system, the PEL must be set, but many surgeons do not do it, so their IOP readings are inaccurate. The handpiece knows exactly where the eye is, so the PEL is always perfectly calibrated.

These technologies boost speed and efficiency. When used together, ACTIVE FLUIDICS technology and the ACTIVE SENTRY Handpiece reduce surge by as much as 50%. The amount of additional surge protection depends on the target IOP and the vacuum limit at occlusion break.¹ Maintaining a stable chamber at a lower IOP makes the experience more comfortable for the patient. As a result, surgeons can be much more aggressive, safely setting high vacuum limits and spending less time in the eye. What's more, the polymer INTREPID Hybrid Tip (Alcon) can help reduce the risk of trauma such as capsular tears, making surgery both safer and more efficient as surgeons proceed with greater confidence.

Just as the advent of phacoemulsification made cataract surgery less traumatic, major advances in fluidics have continued to make procedures safer and more efficient. ACTIVE FLUIDICS technology broke new ground in this area, now enhanced by the ACTIVE SENTRY Handpiece. As the four surgeons featured in this supplement will describe, these technologies are having a significant effect on the safety, predictability, and outcomes of cataract procedures. ■

1. Thorne A, Dyk DW, Fanney D, et al. Phacoemulsifier occlusion break surge volume reduction. *J Cataract Refract Surg*. 2018;44(12):1491-1496.

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ENHANCING THE SAFETY PROFILE OF CATARACT PROCEDURES WITH THE ACTIVE SENTRY HANDPIECE AND INTREPID HYBRID TIP

Help limit complications with a combination of sensitive, automated IOP control and polymer technology phaco tip.

BY DAVID LUBECK, MD



Over the last 2 decades, we have been gradually reinventing phacoemulsification. The first technological change that had a significant impact on my approach was torsional ultrasound with the INFINITI Vision System (Alcon), which really helped me rethink my procedure. Next, the CENTURION Vision System (Alcon) Active Fluidics allowed me to select and maintain IOP so I could define and plan precisely what I wanted to do in each procedure and carry out the plan safely and efficiently. Now the CENTURION Vision System with ACTIVE SENTRY Handpiece combines ACTIVE FLUIDICS (Alcon) technology with a pressure sensor in the handpiece that measures intraoperative IOP directly. Also available is a polymer-ended phaco tip, the INTREPID Hybrid Tip (Alcon), which is designed to reduce the risk of capsular tears. The combination has made my phacoemulsification procedure safer, plus more efficient and controlled than ever before.

AUTOMATED FINE CONTROL OF IOP

Before the CENTURION, operating at or near physiologic IOP was not safely feasible. When we got the CENTURION, the ability to operate at physiologic IOP was novel at first, but I found the transition to be very intuitive. It was certainly compelling because we are always trying to achieve normal visual physiological optics and normal physiologic pressure management in all disease states. Remaining at physiologic levels during surgery supports those goals.

With the introduction of the ACTIVE SENTRY Handpiece (Alcon), not only was it feasible to operate at or near physiologic IOP, but it also became possible to refine IOP to precise levels tailored to different patients. With ACTIVE SENTRY, continuous IOP monitoring, leakage compensation, and automated patient eye level (PEL) provide a noticeably more stable intraocular environment and mitigate instability that can arise. The handpiece gives me an even greater degree of subtlety, precision, and scalability. It allows me to approach any lens with a great

With the introduction of the ACTIVE SENTRY handpiece, not only was it feasible to operate at or near physiologic IOP, but it also became possible to refine IOP to precise levels tailored to different patients.

deal of forethought and planning, thus helping ensure my confidence in the success of the procedure.

By offering precise control, the ACTIVE SENTRY Handpiece improves the safety profile of phacoemulsification. That new base line in safety advantage is enhanced tremendously with another remarkable innovation, the INTREPID Hybrid Tip.

THE ADDED SAFETY OF POLYMER TECHNOLOGY

Designed to lower the risk of damage to the capsular bag and other tissues, the INTREPID Hybrid Tip has a polymer end with no sharp or metal edges. The ultrasonic and fluidics performance are similar to the all-metal INTREPID Balanced Tip. Because of the decreased risk of capsular rupture with the Hybrid Tip, phacoemulsification can be performed closer to the capsule and/or with higher flow and vacuum levels. This can help surgeons operate more comfortably with their existing techniques and give them the confidence to evolve their procedures.

We always welcome ways to reduce the rate of capsule rupture to help in safer procedures with better outcomes. Used together, the ACTIVE SENTRY Handpiece and INTREPID Hybrid Tip are effective innovations I've seen in my career to decrease the incidence of capsule rupture.

I also use the INTREPID Transformer I/A Handpiece (Alcon), which has the same polymer technology. Using polymer-tipped instruments throughout the procedure gives a sense of ease to all steps of lens removal. I can focus more closely on the

The all-polymer procedure feels like the wave of the future. It changes the way I interpret the procedure moment to moment, making it a richer, more fulfilling experience and a more efficient procedure overall.

subtleties or complexities of procedures instead of focusing on the elements of risk. For example, during phacoemulsification, I'm less frequently trying to assess how close the instrument is to the capsule or iris. By changing my focus, I can look at broader aspects of the procedure, such as nucleus position, capsular stability, and fluidic dynamics. The all-polymer procedure feels like the wave of the future. It changes the way I interpret the procedure moment to moment, making it a richer, more fulfilling experience and a more efficient procedure overall.

Because the INTREPID Hybrid Tip enhances my ability to more confidently disassemble the nucleus with an increased safety profile, I choose to use it in all but the very densest of nuclei (up to grade 4). By marrying the ACTIVE SENTRY Handpiece and INTREPID Hybrid Tip, I get the greatest possible flexibility and versatility from the CENTURION Vision System platform.

CASE: SAFER, MORE EFFICIENT CATARACT SURGERY

I performed cataract surgery on a 77-year-old woman with 2 to 3+ nuclear sclerosis and 2+ cortical changes.

A tapered sideport incision was made with a 1-mm blade. A square 2.2-mm clear corneal incision was made temporally. DisCoVisc OVD (Alcon) was used throughout the procedure. The approximately 5-mm capsulorhexis was decentered nasally 0.5 mm. Cortical hydrodissection was performed until the nucleus could spin freely within the capsular bag.

For phacoemulsification, I used the INTREPID Hybrid Tip, which has the familiar Balanced Tip design with an innovative polymer end. There are no metal edges on this tip, so at no point can metal contact the capsule or other intraocular structures (Figure 1). This makes the tip much less likely to cause damage to the capsule or iris. The performance of this tip is similar to its all-metal counterpart; it grooves very efficiently for divide and conquer, and it holds the nucleus well for a chopping technique.

► **ACTIVE SENTRY adjustments:** Throughout the entire procedure, a sensor in the ACTIVE SENTRY Handpiece directly and continuously monitored IOP and managed the target IOP of 36. This technology also automates the patient eye-level function so that I do not need to sit the patient at any particular height to achieve the desired IOP for surgery.

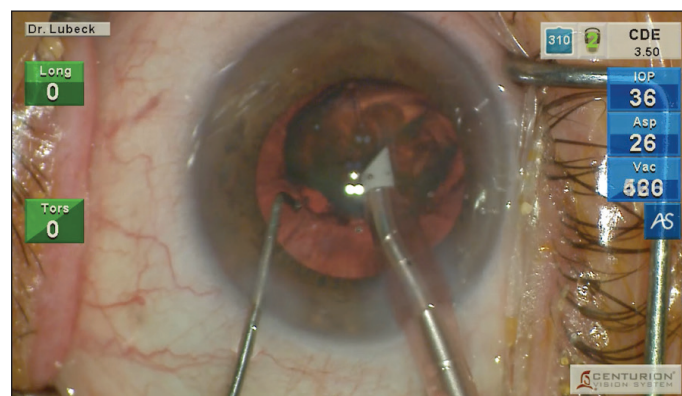


Figure 1. For phacoemulsification, I used the INTREPID Hybrid Tip, which has a familiar BALANCED design with an innovative polymer end. There are no metal edges on this tip, so at no point can metal contact the capsule or other intraocular structures.

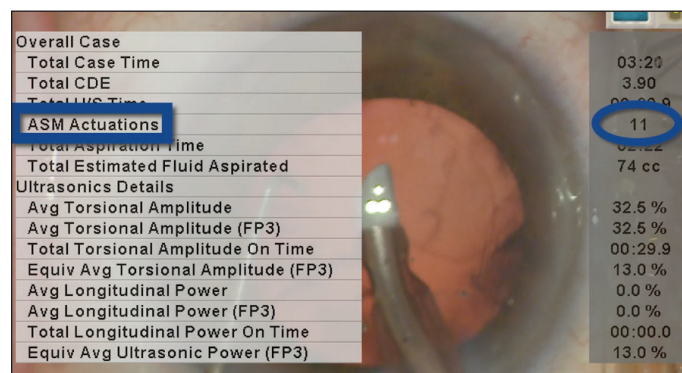


Figure 2. In this case, ACTIVE SENTRY engaged 11 times during phacoemulsification. This means that, at 11 different moments, the technology prevented or mitigated a surge event.

The handpiece also adjusts for average incision leakage, making the chamber significantly more stable. This feature has allowed me to raise my aspiration and vacuum levels, permitting a more efficient and predictable nucleus disassembly and removal. In this case, ACTIVE SENTRY engaged 11 times during phacoemulsification. This means that, at 11 different moments, the technology prevented or mitigated a surge event (Figure 2). Whether you use the ACTIVE SENTRY Handpiece with the INTREPID Hybrid Tip or a standard balanced tip, it provides a significant procedural advantage over gravity-based systems that don't have this level of sophistication in fluid management. I removed the nucleus using a CDE of 3.90, which appears to be lower than what I would have needed previously with a metal Balanced Tip and lower vacuum settings.

► **Cortex removal and polishing:** Next, to remove the cortex, I used the INTREPID Transformer I/A Handpiece, which is also a novel and commendable innovation. In its primary mode, it is a coaxial polymer-tipped I/A handpiece. The polymer tip design allows me to place the tip up against the anterior and posterior capsules. When access to the subincisional cortex is required,

the handpiece separates, and I insert the aspiration tip through the 1-mm sideport incision.

In this bimanual mode, I can easily assess the complete circumference of the capsular bag and polish the entire anterior capsule. If the capsule is at all unstable, then the bimanual mode facilitates easier cortex removal. When posterior capsular polishing is needed, the capsule can be drawn into the aspiration port and the tip passed across the capsular plane, yielding the clearest possible capsule.

Finally, I inserted the new lens. The viscoelastic was aspirated from the anterior chamber and behind the lens, finishing the cataract surgery.

CASE: A SMOOTH PROCESS WITH AN INTRAOPERATIVE ADJUSTMENT

Using the LENSX femtosecond laser (Alcon) I performed surgery on a 72-year-old woman with a 2 to 3+ nuclear and 2+ cortical cataract.

After opening the incisions, the capsule was drawn centrally to make sure that it was free and had no microadhesions. Hydrodissection was performed gently and slowly until all gas had been released anteriorly and the nucleus could be rotated within the capsular bag. Phacoemulsification was performed using the ACTIVE SENTRY Handpiece for fluidics management and the INTREPID Hybrid Tip, a balance-designed tip with a polymer end. The polymer tip's efficiency is similar to a metal balanced tip, so it engages the nucleus and holds easily for division and emulsification of individual segments.

► **Maintaining target IOP with ACTIVE SENTRY:** The ACTIVE SENTRY IOP Handpiece sensor continually, directly monitors IOP throughout the procedure, communicating with ACTIVE FLUIDICS. The system automates patient eye level, so it's no longer necessary to set that on the panel or position the patient at a certain height. It also adjusts for average leakage from incisions. All of this occurs automatically in the background, engaging intermittently as needed to mitigate surge events and maintain chamber stability.

In this case, where the lens is graded a 2 to 3+, it was emulsified very efficiently. ACTIVE SENTRY allowed me to increase the flow and vacuum rates by as much as 30% and maintain a very stable chamber, even working at a near-physiologic IOP of 36 mm Hg (Figure 3).

The polymer Hybrid Balanced Tip is exceptionally capsule-friendly, allowing me to work much closer to the capsule for nucleus, epinucleus, and even partial cortex removal. Many of the maneuvers I performed would not be feasible with a metal balanced tip.

Phacoemulsification required a CDE of 5.89. The ACTIVE SENTRY engaged a total of seven times during nucleus removal.

► **Cortex removal and polishing:** Irrigation and aspiration of the cortex were done with the INTREPID Transformer I/A Handpiece, another Alcon polymer-tipped aspiration instrument (Figure 4). This handpiece starts as a coaxial I/A and converts to a bimanual if needed. The second handpiece is disengaged from the back of the first, and the aspiration tip is inserted through the 1-mm sideport incision. It can be used to polish the posterior capsule and remove any cortex that was inaccessible with the handpiece in coaxial mode. The aspiration port on the transformer bimanual handpiece has an oval contour that's ideal for polishing the capsule. For the posterior capsule, polishing can be achieved by gently engaging the capsule with the tip and then dragging the tip slowly across the capsular surface.

► **Intraoperative aberrometry and lens implantation:** The anterior chamber and capsular bag were filled with ProVisc OVD (Alcon) and the pressure raised to the appropriate level. I turned off the microscope light, and the patient fixated on the red light within the ORA SYSTEM technology (Alcon) so I could take several

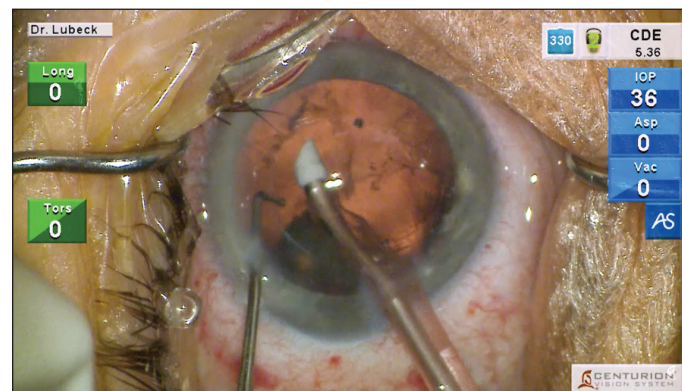


Figure 3. The grade 2 to 3+ nucleus was emulsified efficiently. ACTIVE SENTRY allowed the flow and vacuum levels to be raised by as much as 30% and maintain a stable chamber while operating at a near-physiologic IOP of 36 mm Hg.

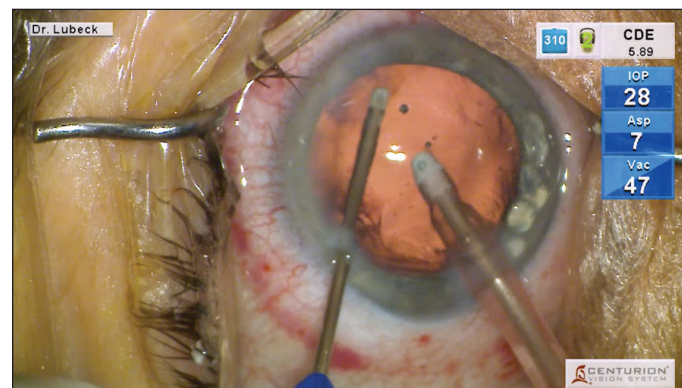


Figure 4. The cortex was irrigated and aspirated with the INTREPID Transformer I/A handpiece, the polymer-tipped instrumentation for cortex removal and capsule polishing.

series of measurements. A lens was chosen and implanted to provide the desired outcome.

Once again, I used the INTREPID Transformer I/A Handpiece for aspiration of the viscoelastic. The polymer tip is ideally designed to go behind the lens and safely work close to the capsule. It's also an excellent lens manipulator, so it can be used to center and rotate the IOL.

The combination of the ACTIVE SENTRY Handpiece and ACTIVE FLUIDICS, with the polymer technology of the INTREPID Hybrid Tip and INTREPID Transformer I/A

Handpiece, results in a very efficient and improved procedure. With precise control of IOP throughout surgery and lower risk of injury from the polymer-tipped instruments, I can focus on surgery with less concern about inducing complications. ■

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PERFORM CATARACT SURGERY MORE CONFIDENTLY WITHOUT CHANGING YOUR TECHNIQUE

Compared to previous Alcon devices, the sensor-enabled ACTIVE SENTRY Handpiece enhances ACTIVE FLUIDICS control of anterior chamber stability, while a polymer INTREPID Hybrid Tip helps to protect the capsule.

BY LAWRENCE WOODARD, MD



Fluidics technologies for cataract surgery are always improving to better meet the primary goals of chamber stability and consistency. I've recently begun using some new components of the CENTURION Vision System (Alcon),

including the ACTIVE SENTRY Handpiece (Alcon), which has a built-in pressure sensor that allows it to work with the system's ACTIVE FLUIDICS technology (Alcon), enhancing stability automatically throughout surgery. Also improving the safety of surgery is the new INTREPID Hybrid Tip (Alcon), which breaks up even dense nuclei and helps reduce the risk of capsular tears.

EMPLOYING AUTOMATED PRESSURE CONTROL

When I began using the ACTIVE SENTRY Handpiece, I thought I would feel something different during the procedure. Instead, I found that the technology senses intraocular pressure (IOP), triggers precise adjustments to the fluidics, and maintains the target IOP throughout surgery without any noticeable difference to my surgical experience. I'm performing cataract surgery as I have always done, reaping the benefits of ACTIVE SENTRY without making any adjustments to my procedure.

The first time I used a Hybrid Tip, I thought it would not penetrate dense nuclei as well as a metal tip, but I was very impressed with its ability to penetrate.

Occasionally, I can detect where there has been a postocclusion surge event when ACTIVE SENTRY would trigger an adjustment, but it's rare. After surgery, the system displays the number of times that the sensor triggered a change, which could be anywhere from 0 to possibly as high as 15 or more.

The standout benefit of surge mitigation is that it makes my procedures safer. It ensures that the anterior chamber is more stable with less IOP fluctuation and less change in fluid volume during surgery. With the ACTIVE SENTRY Handpiece, I get the advantages of a safer procedure without the need to change my approach.

The only significant change I've made to my procedure was to lower my IOP to a much more physiologic level. Because I like higher vacuum levels, I've always needed a higher IOP to maintain chamber stability. But with the ACTIVE SENTRY Handpiece, I've noticed the chamber is stable even in those postocclusion surge events, and therefore I've been able to lower my target IOP during surgery. In past cases where I would set a target IOP of 75 mm Hg to maintain a consistent fluid volume in the eye at high vacuum levels, I now set a target IOP of 55 to 60 mm Hg and still maintain the same chamber stability. As I gain experience, perhaps my IOP will drift lower.

THE ADDED SAFETY OF POLYMER HYBRID TIPS

Further adding to the safety of my cataract procedures, I have begun using the INTREPID Hybrid Tip with the ACTIVE SENTRY Handpiece. The polymer construction ensures that no metal comes in contact with the capsular bag, thus reducing the risk of tears. The first time I used a Hybrid Tip, I thought it would not penetrate dense nuclei as well as a metal tip, but I was very impressed with its ability to penetrate. Now I'm comfortable using a Hybrid Tip on virtually all nuclei except the densest ones.

Surgery with the Hybrid Tip is the same as standard tips, so the transition is completely seamless. In all of my standard cases up to 3+ nuclei, I don't feel there is any difference in the time required compared to standard CENTURION Vision System settings and tips. I'd say that, in cases with dense nuclei, the ACTIVE SENTRY Handpiece and Hybrid Tip slightly increase the time to perform the procedure, but I feel the better safety profile of these two technologies outweighs any slight decrease in efficiency. With denser nuclei, we are more likely to encounter complications, and I'm happy to take a few extra seconds to avoid them.

THE RIGHT TECHNOLOGIES FOR COMPLEX CASES

As I mentioned, I use the ACTIVE SENTRY Handpiece and Hybrid Tip for just about all of my cases. In addition, there are several complex cases where I feel the abilities of these two technologies to maintain a stable chamber and protect the capsular bag are particularly beneficial.

First, when patients have a floppy iris or a small pupil with more potential volatility, a stable chamber makes the iris less floppy and reduces the likelihood that the pupil will continue to constrict during the procedure. I am also less likely to damage the iris with the Hybrid Tip during those procedures.

Second, in cases with extremely dense nuclei, we tend to get more occlusion with a greater potential for postocclusion surge. Those cases take longer as we spend more time in quadrant removal compared to standard cases. And the more time we spend performing quadrant removal, the more likely we are to encounter complications such as posterior capsule rupture. By making postocclusion surge less significant, ACTIVE SENTRY can

improve safety in these cases.

Finally, in postfemtosecond laser cases where the nucleus has been softened significantly, there is potential for significant fluctuations in the anterior chamber. The nuclei tend to be softer, so I'm able to vacuum them while using little ultrasound. As the vacuum builds, without a lot of ultrasound, there is greater opportunity for postocclusion surge, and the ACTIVE SENTRY controls those surges.

ADDED SAFETY IS PARAMOUNT

The ACTIVE SENTRY Handpiece increases the safety of cataract procedures by mitigating postocclusion surge events. The pressure sensors in the ACTIVE SENTRY Handpiece enable the system to respond to the drop in IOP much faster than sensors in the machine, triggering an adjustment in the volume of fluid in the anterior chamber. As a result, my patients' IOP does not drop as significantly during the phacoemulsification portion of the procedure.

I compare the combination of ACTIVE SENTRY and ACTIVE FLUIDICS technology to the automatic braking systems available in cars today. When the vehicle detects an obstacle or disruptive event in its surroundings, such as a truck stopping short in front of you, the automatic braking technology responds faster than you could to stop your car before a collision occurs.

That's the ACTIVE SENTRY role. It detects surge events and rapidly mitigates them by changing the intraocular environment. It helps to prevent a more disruptive event that might occur if I needed to react and make the adjustment. When we add the advantages of using the Hybrid Tip's rounded polymer edge for effective sculpting and quadrant removal that protects intraocular tissues, the CENTURION has made major strides in advancing the safety of cataract surgery.

CASE: FEMTOSECOND CAPSULOTOMY AND TORIC LENS IMPLANTATION

A 74-year-old patient with a 2+ to 3+ cataract was scheduled for cataract surgery and implantation of a toric lens. After the patient underwent both a capsulotomy and lens fragmentation with the LenSx femtosecond laser (Alcon), I made laser incisions all the way out at the limbus and was able to open them very easily. At that point, we had a free-floating capsulotomy.

► **Removing the nucleus with ACTIVE SENTRY and the INTREPID Hybrid Tip:** I used the INTREPID Hybrid Tip with the rounded polymer tip that protects the posterior and anterior capsules. I began sculpting, removed a lot of the nucleus with very little ultrasound—which is our goal when we've done a laser procedure—and presoftened the nucleus. The tip allowed me

to manipulate and rotate the nucleus during the procedure very efficiently, and it moved smoothly through the almost 3+ nucleus (Figure 1).

I began quadrant removal using very little ultrasound as I vacuumed each quadrant. I applied ultrasound when necessary, but what I love about CENTURION Vision System and ACTIVE FLUIDICS, along with the new ACTIVE SENTRY Handpiece, is that I can utilize a higher vacuum than I did with prior technologies, yet still maintain a very stable anterior chamber. It allows me to perform more of the procedure under aspiration and less under phaco.

► **High vacuum, IOP consistent at 60 mm Hg:** While removing the quadrants during this procedure, my vacuum setting was 700+, which is the maximum on the machine, but the anterior chamber remained very stable. The sensor in the ACTIVE SENTRY Handpiece quickly detected the postocclusion

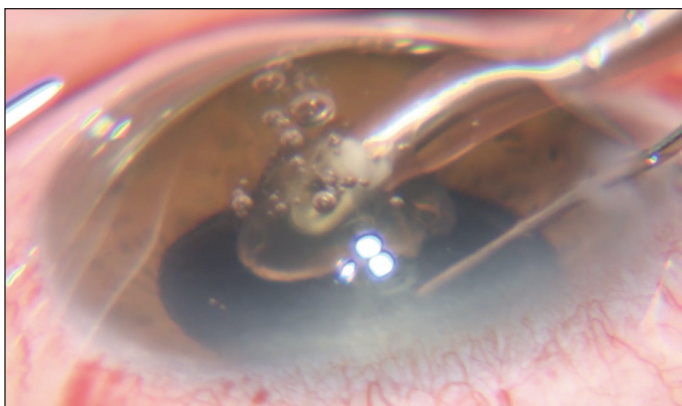


Figure 1. The rounded polymer INTREPID Hybrid Tip moved smoothly through the almost 3+ nucleus, making removal easy with very little ultrasound while protecting the capsule. The new ACTIVE SENTRY Handpiece allowed me to use the highest vacuum settings while maintaining an IOP of about 60 mm Hg.

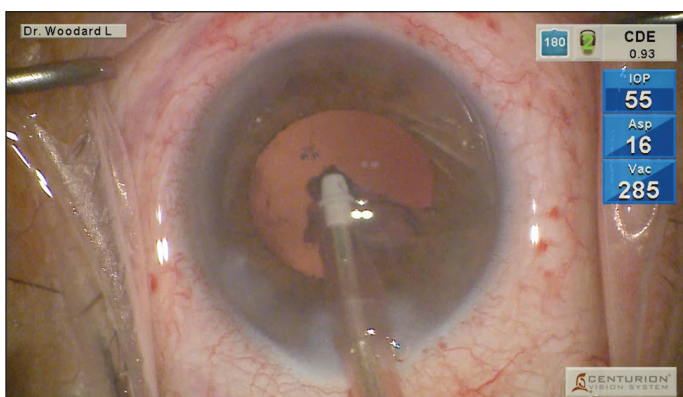


Figure 2. Using the curved polymer I/A tip, I removed the peripheral cortex and some of the subincisional cortex without difficulty in a consistent, controlled manner and very gently polished the posterior capsule.

surge, instantly triggering mitigation through ACTIVE FLUIDICS. While removing the last quadrant, I saw hardly any movement in the iris or the posterior capsule, even with a vacuum of 700.

Looking at the metrics from this case, I saw that the ACTIVE SENTRY Handpiece had a total of 10 actuations. That represents the number of times that the handpiece detected a postocclusion surge event and made adjustments to ensure that there was minimal fluid loss and the chamber remained stable. The CDE was only 0.93 for an almost 3+ nucleus density.

► **Cortex removal and polishing with a polymer I/A tip:** Next, I moved to the polymer I/A tip, which also has the same polymer material as the Hybrid Tip for better safety design. This I/A tip makes cataract surgery a complete polymer-tip procedure, so there are no sharp, metallic objects in the eye at any point during surgery from the phaco machine perspective.

The I/A tip comes in both rounded and angled profiles. Using the curved polymer I/A tip, which I really like for laser cases, I removed the peripheral cortex and even some of the subincisional cortex without difficulty in a consistent, controlled manner (Figure 2). I had no worries about sharp, metallic instruments in the eye that could harm the capsule. As I polished the posterior capsule very gently with the curved I/A tip, I was able to remove all the material quite easily.

► **Implanting the toric lens:** Because this was a toric case, I filled the eye with sodium hyaluronate (PROVISC; Alcon) in preparation for taking ORA SYSTEM (Alcon) technology measurements. I like to fill the eye until I see viscoelastic coming out of the incision, because that usually indicates that we have adequate IOP. I used a Barraquer tonometer to confirm that the patient's IOP was in the correct range (55 to 60).

Using the ORA SYSTEM measurements, I selected the 20.0 diopter lens. The options were the SN6AT4 (Alcon) lens, which would leave us with approximately 0.1 diopters of against-the-rule astigmatism, or the SN6AT5 (Alcon), which would leave us with almost 0.4 diopters of with-the-rule astigmatism. I could either flip the axis and leave the patient almost 0.4 diopters or leave him with 0.1 diopters in the same axis. Generally, I like to leave the least residual astigmatism possible, so I selected the SN6AT4 in this case to leave the patient with only 0.1 diopters of residual astigmatism on his current axis.

I placed the IOL using the AutoSert device, which allows me to deliver the IOL into the eye in an automated manner using the flip pedal on the CENTURION machine. I can use a one-handed technique, holding the eye stable with the other hand as I insert the lens. It utilizes the same D-cartridge that I would ordinarily use and delivers it into the eye in a very controlled manner.

NRR (no rotation recommended) appeared on the ORA machine, so I anticipated that the lens would deliver exactly

what we were expecting. Getting NRR with minimal residual astigmatism gives me a lot of confidence in the IOL selection and placement on the correct axis to deliver the expected outcomes. Finally, I removed the residual viscoelastic. The case was very successful, relying on the latest technologies to ensure the patient had excellent visual outcomes. ■

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EVALUATING TWO KEY SAFETY ADVANCES IN THE *CENTURION* VISION SYSTEM

How the sensor-enabled ACTIVE SENTRY Handpiece stabilizes the anterior chamber while the polymer INTREPID Hybrid Tip reduces phaco complications compared to previous Alcon devices.

BY ROBERT J. CIONNI, MD



During lab development and several weeks of pre-market use, I had the opportunity to try the CENTURION Vision System's (Alcon) new ACTIVE SENTRY Handpiece (Alcon) in various clinical situations and determine whether it makes a positive difference in surgery. During cataract surgery, sensors incorporated in the ACTIVE SENTRY Handpiece continually communicate with the system's ACTIVE FLUIDICS (Alcon) component, which in turn makes instant, automatic adjustments to maintain a stable anterior chamber. In using this technology, I found that the ACTIVE SENTRY made a marked difference in chamber stability throughout my cataract procedures. In fact, the

improvement was so pronounced that I didn't want to return to the standard handpiece.

RESPONSIVE HANDPIECE SENSOR

When the pressure sensor is located in the fluidics module, the pressure change must be transferred through the collapsible tubing. It's a delay of many milliseconds, and by the time the system senses a change, it may be too late to respond to the surge. This results in some fluctuation in the chamber that can be problematic or cause complications, particularly if the surgeon is working at a higher vacuum and/or flow rate. By moving the sensor to the ACTIVE SENTRY Handpiece, the delay is minimized, and the system can correct drops in pressure more quickly and better control any surge.

This invaluable function is transparent to the surgeon, who does nothing differently and hears no indication that correction has occurred. In many cases, after finishing a case, I did not know if the ACTIVE SENTRY had triggered surge protection at all. When I looked at the metrics, I found it had activated 15 to 20 times in the background, automatically helping to prevent fluctuation of the chamber without distracting me.

When the ACTIVE SENTRY senses a sudden drop in IOP, as we would see with an occlusion break, the CENTURION ACTIVE FLUIDICS very quickly mitigates the change in pressure.

In many cases, after finishing a case, I did not know if the ACTIVE SENTRY had triggered surge protection at all. When I looked at the metrics, I found it had activated 15 to 20 times in the background, automatically helping to prevent fluctuation of the chamber without distracting me.

The primary benefit of the ACTIVE SENTRY Handpiece is to improve chamber stability, which means better safety. If your chamber is not volatile, your procedure is safer. Efficiency is a secondary benefit. Without an automated system, we can do one of two things when we detect volatility: change our settings or work more slowly. Automation eliminates those inefficiencies.

APPROPRIATE FOR MOST CASES

During the weeks that I had the ACTIVE SENTRY in our surgery center, I used it for all types of cases. The handpiece provides benefits, regardless of what we think preoperatively about the likelihood that the patient will have volatile chambers. In reality, volatility is very hard to predict. We know it's likely in certain patients, such as overweight patients with significant orbital fat, patients with tight lids, and high myopes. But even in apparently routine cases, some volatility can occur.

In addition to maintaining a stable chamber during surgery, the ACTIVE SENTRY helps to eliminate one common reason for chamber volatility in otherwise normal cases: inaccurate eye level settings. The ACTIVE SENTRY Handpiece automatically detects the patient's eye level. Without this feature, the surgeon or scrub technician needs to set the eye level manually to ensure that we're operating at the desired pressure. I believe that many surgeons may sometimes not take the time to set the level manually, and the result may be increased chamber fluctuation. Like pressure sensing in the ACTIVE SENTRY, automated eye level setting ensures a more stable chamber and safer surgery.

With this reliable stability and added safety comes surgical confidence. With the ACTIVE SENTRY, we learn to perform procedures without worrying about volatility in the chamber. It's another benefit that's valuable in every case.

The ACTIVE SENTRY is designed with the comfortable ergonomics required to bring instruments into everyday surgical use. The handpiece is at least as comfortable as the current alternative and approximately 10 g lighter. I could use it all day without discomfort or fatigue.

ADDED SAFETY: INTREPID HYBRID TIP

The polymer I/A tip (Alcon) was surgeons' first introduction to polymer tips, and it quickly gained a groundswell of support. Many surgeons have moved to the polymer I/A tip because it helps to boost safety. To me, it's an example of the best kind of tool—one that can improve outcomes and makes us better surgeons by enhancing safety and efficiency.

The next step in polymer instruments for cataract surgery is the CENTURION Vision System new INTREPID Hybrid Tip (Alcon). Despite my affinity for the polymer I/A tip, I approached the Hybrid Tip with my usual skepticism, asking

Any metal tip can have a little burr, scratch, or chip on an edge, which can catch on the capsular bag. That can't happen with a single-use, disposable polymer Hybrid Tip.

if and how it would benefit my procedures. I wondered how a polymer tip could be as efficient as a standard tip without having any sharp metal edges.

When I tried the Hybrid Tip, I found that it cuts very well and does not have any negative effect on my efficiency. More importantly, the Hybrid Tip is much less likely to break or damage the capsule if we inadvertently make contact. Any metal tip can have a little burr, scratch, or chip on an edge, which can catch on the capsular bag. That can't happen with a single-use, disposable polymer Hybrid Tip. It's soft and kind to whatever tissue it engages.

At the same time, the Hybrid Tip can remove segments of the nucleus and make grooves for a divide-and-conquer approach, even in a grade 3 cataract. Like a metal tip, as soon as the Hybrid Tip gets a piece of the nucleus inside it, it creates vacuum to remove the segments. The only case where you may lose some efficiency in low vacuum sculpting is with a mature or brunescient cataract, yet it still can perform well once the cataract is fragmented.

COMBINED ADVANTAGES

I believe that once surgeons try the ACTIVE SENTRY Handpiece, they're going to want to use it in every case. The combination of the ACTIVE SENTRY and the Hybrid Tip will be very powerful in improving safety and efficiency. Relying on their combined advantages during surgery, my confidence that I would perform a case without any major complication went way up. I could work more efficiently and increase my vacuum levels, knowing with confidence that the procedure would be consistent and controlled.

CASE: FLOPPY IRIS AND ZONULAR WEAKNESS

My patient had a grade 2 nuclear sclerotic cataract and underwent cataract surgery with placement of a toric IOL. The patient also had a floppy iris due to using tamsulosin (Flomax; Sanofi). I used the ACTIVE SENTRY Handpiece with its built-in pressure sensor, which works closer to the action to detect changes in pressure and initiate a response more quickly, compared to using a sensor placed further back in the fluidics system.

► **Floppy iris and zonular weakness:** Because the patient had a small pupil and floppy iris, I decided to place a Malyugin Ring (MicroSurgical Technology). During the capsulotomy, I determined that the bag felt a bit floppy as well; I suspected there could be some zonular weakness.

I didn't want to displace the entire nucleus, which could damage zonular fibers that were already weak. After hydrodissection with a Chang Cannula (Katena), I used a two-handed rotation method to free the nucleus and avoid displacing it, which could damage the zonular apparatus. Next, I tried to pre-chop. I was able to get a little bit of divide, but visualization was not great; I proceeded with phaco to avoid zonular damage.

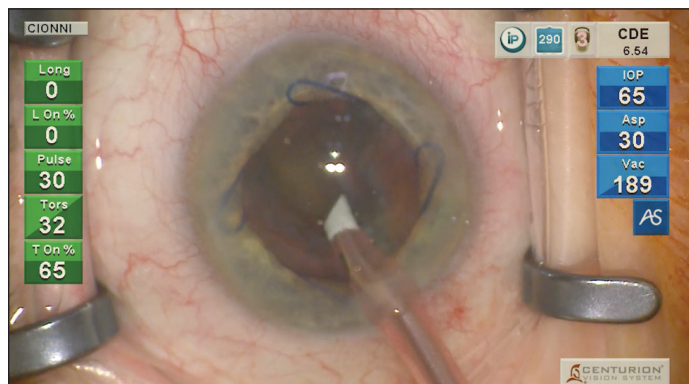


Figure 1. This patient had a floppy iris and zonular weakness. The rounded polymer INTREPID Hybrid Tip allowed me to divide the nucleus of this grade 2 cataract and vacuum away each quadrant quickly and efficiently, while the ACTIVE SENTRY Handpiece maintained a rock-solid, stable chamber.

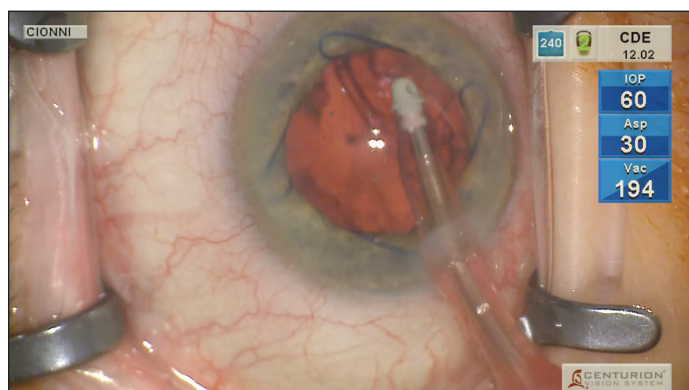


Figure 2. Cortex aspiration with the polymer I/A tip reduced the likelihood of capsular damage. As I used the polymer I/A tip to remove the cortex and polish the floppy capsule, I could barely generate any vacuum. It would just collapse. This weakness showed just how well the ACTIVE SENTRY had excelled at maintaining a stable chamber during phacoemulsification.

► **Phacoemulsification with the Hybrid Tip:** The ACTIVE SENTRY Handpiece maintained a nice, stable chamber, even with a floppy iris and some weakened zonular fibers. Using the polymer Hybrid Tip, I carefully divided the nucleus (Figure 1). As I segmented each quadrant, the ACTIVE SENTRY vacuum removed it quickly and efficiently while maintaining a rock-solid, stable chamber. The lens was a little resistant to rotation, so instead of challenging the zonular fibers, I used the two-handed method to encourage it to turn.

Once pieces began coming into the tip, I could keep the tip still. The followability was so good with the fluidics that segments moved into the tip. Again, the chamber remained stable. Occasionally during quadrant removal, I could see a blue flashing light on the monitor, indicating that ACTIVE SENTRY was reacting to a sudden drop in pressure and opening the vent to allow more fluid to come into the line and mitigate the occlusion break surge. Finally, I flushed all the angles with BSS (Alcon) to make sure no nuclear chips remained.

► **Cortex removal and polishing:** Next, I began cortex removal with the polymer I/A tip (Figure 2). The polymer construction is much less likely to damage the capsule than a sharp metal tip, and the tip is disposable, so we don't have to worry about defects that could come from cleaning it. We use a brand new one every time.

As I polished the floppy capsule, I could barely generate any vacuum before it would wrinkle. It was a real testimony to how the ACTIVE SENTRY had kept a very floppy iris and floppy bag stable throughout phacoemulsification. In addition, the added level of safety afforded by the polymer I/A tip helped ensure that there was no rupture when the capsule did come forward.

► **Implanting the toric lens:** To place the IOL, I filled the bag with sodium hyaluronate (PROVISC; Alcon) OVD and gently injected the lens in the bag. Going behind the implant with the polymer I/A tip, I removed the viscoelastic, centered the implant, and aspirated into the angles. Finally, I hydrated the incision. What could have been a very challenging case was made easier by the ACTIVE SENTRY, as well as the Hybrid Tip and polymer I/A tip. ■

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CATARACT SURGERY GETS TWO VALUABLE INCREMENTAL IMPROVEMENTS

This safe, efficient procedure gets a welcome boost from the ACTIVE SENTRY sensor-enabled handpiece and the polymer INTREPID Hybrid Tip.

BY JOHN P. BERDAHL, MD



Every day that we prepare in the operating room, we want to be our best for the patients who put their trust in us. When technologies come along that allow us to improve, we certainly welcome their help.

With these ideas in mind, I have recently begun using the CENTURION Vision System (Alcon) new ACTIVE SENTRY Handpiece (Alcon), which has built-in sensors that immediately detect changes in the anterior chamber and trigger a faster response from the fluidics system. I've also started using the system's INTREPID Hybrid Tip (Alcon), a polymer phaco tip that reduces the risk of capsular damage. Individually, the two technologies have made a measurable difference in my cataract surgery; together, they help improve safety and efficiency on several levels.

ACTIVE SENTRY STABILITY

Cataract surgery is the most common surgical procedure performed in the United States, and it is generally safe. I welcome every incremental improvement we can make. ACTIVE SENTRY is a meaningful evolution that's taking an already good surgery and making it better.

The purpose behind the ACTIVE SENTRY is to move sensors from the phaco unit (Active Fluidics, Alcon) to the handpiece, making the system more responsive and the chamber more predictably stable. Not only does this help patients with a known risk of instability, but I think performing surgery with the ACTIVE SENTRY helps in every case.

My dad always said, "Routine surgery only happens to other people." We don't always know that an eye will have a problem until the problem actually occurs. It's always best to prevent a problem and avoid a surprise, and ACTIVE SENTRY does that in the most unobtrusive way.

That said, the cases where I rely heavily on the ACTIVE SENTRY advantages are situations where the zonules might be loose. I want that chamber to be absolutely

rock-solid steady, with vitreous stability and no bag popping up and down. In these cases, I have a much-improved surgical experience.

THE EXPERIENCE OF USING ACTIVE SENTRY

When I learned about the ACTIVE SENTRY Handpiece, the concept felt natural to me. I knew I would love to have less surge and less lag time in the fluidics adjustment. It made sense to me to have an IOP sensor in the handpiece, where it's closer and the system can react quicker. I didn't feel any skepticism, but I was curious to see if the chamber would be noticeably more stable and if I would feel it when the ACTIVE SENTRY actuates.

For me, one of the markers of a fantastic technology is that the first time I use it, it feels like I've always used it. I quickly found that the ACTIVE SENTRY Handpiece felt even more natural than other handpieces I'd used. Having the IOP sensor in the handpiece, reacting quicker, and reducing the lag time that I was accustomed to for fluidics to correct the IOP felt very natural as well.

For me, one of the markers of a fantastic technology is that the first time I use it, it feels like I've always used it. I quickly found that the ACTIVE SENTRY Handpiece felt even more natural than other handpieces I'd used.

When I used the ACTIVE SENTRY, the chamber was more stable, but in most cases I didn't notice it. It felt like my procedures were uneventful. I did note the added chamber stability in floppy iris and loose zonule cases.

Sometimes, we realize how much we liked something when it's taken away. When I tried going back to using the standard handpiece, I immediately noticed that I'd been taking the ACTIVE SENTRY Handpiece for granted. ACTIVE SENTRY had been working behind the scenes to make sure my surgery would go smoothly. I could not tell when ACTIVE SENTRY activated during surgery, but after each case, I would look at the metrics and see the technology engaged 5 to 10 times to prevent surge during surgery. Now I will use ACTIVE SENTRY for all my cases—there's no reason not to.

ADDED SAFETY OF THE INTREPID HYBRID TIP

The polymer INTREPID Hybrid Tip for the phaco needle is the same tip material that I've grown to love in the Polymer I/A (Alcon). When I learned it would be available in the phaco needle, I thought it sounded like a natural extension of that technology, but I was also concerned that it might inhibit my cutting efficiency and increase my energies during surgery.

I found that using the Hybrid Tip felt very much like using a metal tip, but with added safety. I use it to take out virtually any type of cataract, grades 1 through 3. I suspect that it would be possible to use the Hybrid Tip on even denser cataracts, but I would need more experience first. I think the cutting efficiency of a traditional INTREPID Balanced Tip would likely be a better option for very dense cataracts, where we want every bit of cutting efficiency we can get.

What I love about the Hybrid Tip is the added safety it provides. If we inadvertently grab the capsular bag, we will not end up in a difficult spot. That makes the tip one of those really nice additions that feels good and is easy to use, and it makes cataract surgery incrementally safer. In my OR, we're also training fellows. When the phaco tip they're using is the Hybrid Tip, I feel much more comfortable supervising surgery. That extra level of safety means we worry less about incidents during training.

What I love about the Hybrid Tip is the added safety it provides. If we inadvertently grab the capsular bag, we will not end up in a difficult spot. That makes the tip one of those really nice additions that feels good and is easy to use, and it makes cataract surgery a bit safer.

COMBINED BENEFITS OF BOTH NEW TECHNOLOGIES

When we take the CENTURION Vision System platform and add ACTIVE SENTRY technology, we get a more stable anterior chamber, which is safer and also further streamlines the procedure. Now we can also use the INTERPID Hybrid Tip for phacoemulsification, which lets us work more freely and efficiently. Both are incremental changes that make an already safe procedure even safer and more efficient. I feel good that we have partners in the industry who are continually raising the bar for the safety and quality of important vision-saving surgeries. When I prepare to give my best every day in the OR, advances like these help me achieve the best results for my patients.

CASE: LOOSE LENS WITH ACTIVE SENTRY AND HYBRID TIP

A 72-year-old patient presented with a grade 2 to 3 cataract. The patient's refraction was myopic, and we determined that a standard IOL was the best choice to deliver the visual outcomes he wanted. The eye exhibited some phacodonesis upon initiating the capsulotomy, so anterior chamber stability was a concern.

INTREPID Hybrid Tip: This was quite a thick lens, and the INTREPID Hybrid Tip cut through it with beautiful efficiency. At the same time, I felt very confident that the polymer tip would make cutting safer. I had more courage to take the Hybrid Tip a little farther posteriorly on my groove because I felt like, if I inadvertently grabbed that posterior capsule, it would be much less likely to tear. It was problem-free (Figure 1).

ACTIVE SENTRY Handpiece and Anterior Chamber Stability: The lens came out very nicely. While I was removing this rather meaty cataract, the anterior chamber remained very stable. That's especially important when we have a lens like this one, which seemed a little on the loose side.

With the ACTIVE SENTRY continually monitoring and prompting adjustments from the Active Fluidics system, there was less bounce of the posterior capsule up to my tip. If that

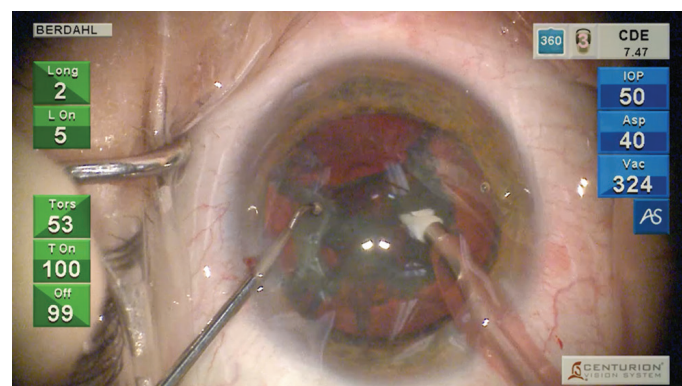


Figure 1. I used the INTREPID Hybrid Tip to break up a thick cataract. The safety of the tip allowed me to move farther posteriorly with minimal concern about damage to the capsular bag.

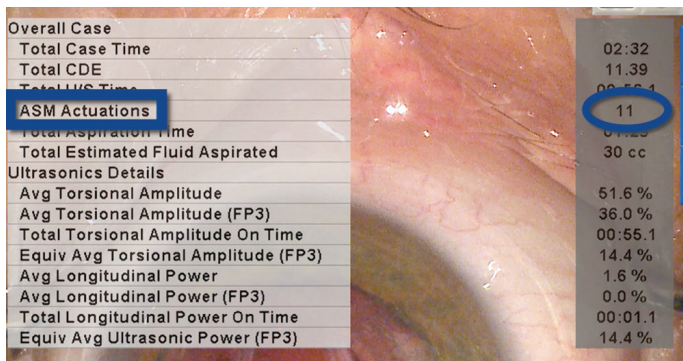


Figure 2. The ACTIVE SENTRY Handpiece actuated 11 times during surgery. Each time the chamber was going to become unstable, the system reacted instantly, prompting adjustments from the Active Fluidics system to keep the chamber stable throughout the procedure. This process was invisible to me as a surgeon.

had bounced up, the Hybrid Tip would have helped mitigate the risk of a tear to the posterior capsule.

ACTIVE SENTRY Metrics: The ACTIVE SENTRY handpiece actuated 11 times during surgery, prompting adjustments from the Active Fluidics system. This number is on the higher side. What that means is that 11 times during surgery, the chamber was going to become unstable, but the ACTIVE SENTRY reacted instantly, so the chamber appeared to be stable throughout the procedure (Figure 2).

ACTIVE SENTRY work is invisible to me because it happens so quickly. Within milliseconds, the sensor determines that the anterior chamber eye pressure isn't where we set it, and Active Fluidics pushes fluid into the eye to make sure the chamber is pressurized

I had more courage to take the Hybrid Tip a little farther posteriorly on my groove because I felt like, if I inadvertently grabbed that posterior capsule, it would be much less likely to tear. It was problem-free.

ACTIVE SENTRY work is invisible to me because it happens so quickly...These are my favorite kind of problems—the ones that a machine solves for me before I even know they exist.

properly. These are my favorite kind of problems—the ones that a machine solves for me before I even know they exist.

Capsule tension ring (CTR) and lens placement: At the beginning of the case, I could tell that there was some looseness of the capsular bag, so at this point I slowed down and put in a CTR for better centration and stability. CTRs are very effective when there's a peripheral zonulopath. I like to insert these rings in a very tangential way so that they just slide in with almost no pressure on the zonules. I was able to place the IOL with no trouble. The lens was well centered, and the addition of the CTR mitigated the capsule instability.

A safer procedure: In this case, I think that combining the Hybrid Tip with the ACTIVE SENTRY Handpiece helped diminish the pressure fluctuation and maintain a safer situation for this patient. We never know when we might get into trouble, but I love knowing that I'm limiting that possibility a bit more with these surgical technologies. The patient's outcomes were excellent, with a mild prescription producing 20/20 BCVA. ■

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CENTURION® Vision System Important Product Information

Federal (USA) law restricts this device to sale by, or on the order of, a physician.

As part of a properly maintained surgical environment, it is recommended that a backup IOL injector be made available in the event the AutoSert® IOL Injector Handpiece does not perform as expected.

INDICATION: The CENTURION® Vision system is indicated for emulsification, separation, irrigation, and aspiration of cataracts, residual cortical material and lens epithelial cells, vitreous aspiration and cutting associated with anterior vitrectomy, bipolar coagulation, and intraocular lens injection. The AutoSert® IOL Injector Handpiece is intended to deliver qualified AcrySof® intraocular lenses into the eye following cataract removal.

The AutoSert® IOL Injector Handpiece achieves the functionality of injection of intraocular lenses. The AutoSert® IOL Injector Handpiece is indicated for use with the AcrySof® lenses SN6OWF, SN6AD1, SN6AT3 through SN6AT9, as well as approved AcrySof® lenses that are specifically indicated for use with this inserter, as indicated in the approved labeling of those lenses.

WARNINGS: Appropriate use of CENTURION® Vision System parameters and accessories is important for successful procedures. Use of low vacuum limits, low flow rates, low bottle heights, high power settings, extended power usage, power usage during occlusion conditions (beeping tones), failure to sufficiently aspirate viscoelastic prior to using power, excessively tight incisions, and combinations of the above actions may result in significant temperature increases at incision site and inside the eye, and lead to severe thermal eye tissue damage.

Good clinical practice dictates the testing for adequate irrigation and aspiration flow prior to entering the eye. Ensure that tubings are not occluded or pinched during any phase of operation.

AES/COMPLICATIONS: Inadvertent actuation of Prime or Tune while a handpiece is in the eye can create a hazardous condition that may result

in patient injury. During any ultrasonic procedure, metal particles may result from inadvertent touching of the ultrasonic tip with a second instrument. Another potential source of metal particles resulting from any ultrasonic handpiece may be the result of ultrasonic energy causing micro abrasion of the ultrasonic tip.

ATTENTION: Refer to the Directions for Use for the accessories/consumables and Operator's Manual for a complete listing of indications, warnings, cautions and notes

Important Product Information for DisCoVisc® OVD

CAUTION: Federal (USA) law restricts this device to sale by or on the order of a physician.

INDICATIONS: DisCoVisc® (Sodium Chondroitin Sulfate-Sodium Hyaluronate) Ophthalmic Viscosurgical Device (OVD) is indicated for use during surgery in the anterior segment of the eye. It is designed to create and maintain space, to protect the corneal endothelium and other intraocular tissues and to manipulate tissues during surgery. It may also be used to coat intraocular lenses and instruments during cataract extraction and IOL insertion.

WARNINGS/PRECAUTIONS: Failure to follow assembly instructions or use of an alternate cannula may result in cannula detachment and potential patient injury. Precautions are limited to those normally associated with the surgical procedure being performed. Although sodium hyaluronate and sodium chondroitin sulfate are highly purified biological polymers, the physician should be aware of the potential allergic risks inherent in the use of any biological material.

ADVERSE REACTIONS: DisCoVisc® Ophthalmic Viscosurgical Device was very well tolerated in nonclinical and clinical studies. A transient rise in intraocular pressure in the early postoperative period may be expected due to the presence of sodium hyaluronate, which has been shown to affect such a rise. It is therefore recommended that DisCoVisc® OVD be removed from the anterior chamber by thorough irrigation and/or aspiration

at the end of surgery to minimize postoperative IOP increases.

ATTENTION: Reference the Directions for Use for a complete listing of warnings and precautions.

Important Product Information for PROVISC® OVD

CAUTION: Federal (USA) law restricts this device to sale by, or on the order of, a physician.

INDICATION: PROVISC® (Sodium Hyaluronate) Ophthalmic Viscoelastic Device (OVD) is indicated for use as an ophthalmic surgical aid in the anterior segment during cataract extraction and intraocular lens (IOL) implantation. Ophthalmic viscoelastics serve to maintain a deep anterior chamber during anterior segment surgery allowing reduced trauma to the corneal endothelium and surrounding ocular tissues. They help push back the vitreous face and prevent formation of a flat chamber during surgery.

WARNINGS/PRECAUTIONS:

- Postoperative increases in intraocular pressure have been reported with sodium hyaluronate products. The IOP should be carefully monitored and appropriate therapy instituted if significant increases should occur. It is recommended that PROVISC® OVD be removed by irrigation and/or aspiration at the close of surgery. Do not overfill anterior chamber. Although sodium hyaluronate is a highly purified biological polymer the physician should be aware of the potential allergic risks inherent in the use of any biological material; care should be used in patients with hypersensitivity to any components in this material. Cannula assembly instructions should be followed to prevent patient injury.

ADVERSE EVENTS:

- Postoperative inflammatory reactions such as hypopyon and iritis have been reported with the use of ophthalmic viscoelastics, as well as incidents of corneal edema, corneal decompression, and a transient rise intraocular pressure.

ATTENTION: Reference the directions for use for a complete listing of indications, warnings and precautions.

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