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Enhanced Speed and Control With the CENTURION Vision System

High vacuum settings permit shorter extraction times and lower cumulative dissipated energy than previous phaco technologies.

BY DAVID ALLEN, BSc, FRCS, FRCOphth

I was the first physician to evaluate the CENTURION Vision System (Alcon) clinically in June 2012, and I continued to use the platform through its commercial launch last year. My colleagues and I at Sunderland Eye Infirmary in the United Kingdom had used the INFINITI Vision System (Alcon) since its introduction in 2003, and we had been impressed with its performance and continued development, such as the addition of Torsional ultrasound and Intelligent Phaco (IP; Alcon). As soon as I started using the CENTURION Vision System with the ACTIVE FLUIDICS technology, however, I realized it surpassed the INFINITI system.[1] This article describes my experience with the CENTURION Vision System.[2]

ACTIVE FLUIDICS TECHNOLOGY

As opposed to gravity-based fluidics systems, ACTIVE FLUIDICS Technology applies pressure directly to the irrigation bag, which is housed inside the CENTURION machine. The bag is connected to a balanced dual-segment peristaltic pump that allows the CENTURION Vision System to constantly adjust to and minimize fluctuations in IOP. Furthermore, low-compliance tubing gives me greater pumping efficiency and less occlusion break surge, all while maintaining a level of IOP closer to the physiological state.

All of this translates to very stable anterior chambers in surgery, regardless of the vacuum level. Traditional phaco systems typically yielded wide fluctuations in IOP. Under the microscope, these fluctuations are evident as changes in the depth of the anterior chamber and movement of the iris up and down. With the CENTURION Vision System, I simply set a target IOP for the surgery, and then the ACTIVE FLUIDICS system continually monitors the aspiration flow rate, infusion pressure, and rate of vacuum to maintain that preset IOP. I no longer need to worry about adjusting my parameters as I raise or lower the vacuum or aspiration flow rate during surgery, because the CENTURION Vision System automatically adapts to these changes.

EFFICACY AND CONTROL USING HIGH VACUUM

Compared to the INFINITI Vision System, the CENTURION has much better control of postocclusion surge, so I am comfortable using the latter platform with much higher vacuum settings. In a study that Dr. David Steel and I recently conducted at Sunderland Eye Infirmary, we found that using higher vacuum settings of 600 mm Hg was more effective than using moderate vacuum of 350 mm Hg with the CENTURION Vision System (Table 1).[3] We used significantly less BSS (Alcon), and we had a shorter cataract removal time with lower cumulative dissipated energy (CDE) using the higher vacuum settings.

	CDE	Fluid Use (cc/mL)	Removal Time
High vac (600 mm Hg)	2.81*	9.51**	28***
Low Vac (350 mm Hg)	3.81*	10.46**	34***

* $p<0.001$ ** $p<0.036$ *** $p<0.001$

Table 1. Out of 178 surgeries (88 through a 2.0-mm incision) performed with the CENTURION Vision System, nuclear extraction times and CDE were significantly lower with the use of high vacuum. The anterior chamber remained remarkably stable, and there were no reported safety issues.[1]

My target IOP is now 34 to 40 mm Hg with the CENTURION Vision System, which is closer to physiological levels. That may sound like a high IOP to many surgeons, but the IOP that most ophthalmologists target with a traditional gravity-based fluidics system is often 70 or 80 mm Hg. I use linear vacuum in foot position 2 that ranges from 350 to 600 mm Hg. The CENTURION Vision System also features linear control in foot position 3, which can be fixed, increased, or decreased as the pedal is further depressed. In foot position 3, I start the vacuum at 600 mm Hg and then gradually reduce it to 500 mm Hg. My flow rate starts at 30 cc/min in foot position 2 and rises to 40 cc/min as I reach foot position 3, where it stays constant.

CASE PRESENTATION

Incisions and Capsulorhexis. The removal of a fairly routine grade 2 cataract may be viewed at http://eyetube.net/series/alcon-centurion/allen-centurion-case-review-/. I began the

Please see page 3 for important information about these products.

surgery by making two 1-mm angled sideport incisions, and then I created the main incision with the 2-mm dual-bevel INTREPID blade. With this phaco machine, I am comfortable using either coaxial I/A or bimanual I/A, although I opted for the latter here.

I instilled preservative-free lidocaine and phenylephrine as well as BSS. In this case, I added PROVISC OVD (Alcon). I generally reserve the use of a dispersive ophthalmic viscosurgical device for two scenarios: (1) patients with a vulnerable cornea, in which case I use the soft-shell technique, or (2) the removal of very hard cataracts, which may require a longer duration of phacoemulsification.

Next, I manually created a capsulorhexis of 5 mm using forceps. I targeted this size because I think it is important for the edges of the capsulorhexis to overlap the anterior surface of the implant's optic.

Nuclear Fragmentation and Removal. Before I began dividing the nucleus, I cleared some of the PROVISC OVD and also some of the central superficial cortex to create space for fluid to circulate. This step allowed me to see the chopper out to the periphery of the lens, and I was able to ensure that I was targeting the correct layer of tissue, underneath the capsular edge. Even if I do not always fragment the nucleus as well as I should, the high vacuum settings on the CENTURION Vision System enable me to purchase the fragments and manipulate them safely.

One advantage of horizontal chopping is that it is only necessary to impale and hold the nucleus for the first chop. I use the phaco tip to stabilize the nucleus and pull it slightly towards me, thereby allowing the chopper to pass over the edge of the nucleus to make the first chop. For subsequent chopping, it is often unnecessary to impale the nucleus with the tip. With vertical chopping, the tip of the chopper must fully impale the nucleus for each chop, so that upward pressure can be made against the downward pressure from the chopper. Normally, I prefer to break the nucleus into six or eight pieces before emulsifying them. I did not create that many fragments in this case; instead, I applied a high vacuum to disassemble the nucleus. With the final fragments, the vacuum went higher than 500 mm Hg, and yet there was no visible postocclusion surge.

Because I used a relatively high flow rate of 40 cc/min, the nuclear material came toward the Balanced tip very easily and stayed there. The amplitude of Torsional ultrasound in this case was very modest; it did not go above 35% or 40%, despite the density of the nucleus. Even so, the Balanced tip cuts so efficiently that the material disappeared quickly with this modest degree of torsional amplitude. At the end of the case, the CDE of nuclear removal was only 3.56, which is quite low for a cataract of this density.

IOL Injection. After cleaning the capsule, I instilled PROVISC again before implanting the IOL. I use the INTREPID AutoSert IOL Injector (Alcon). Surgeons who find it difficult to implant IOLs through incisions smaller than 2.4 mm will appreciate the AutoSert, because it is a single-handed device, which will let them use their second hand to stabilize the eye. Surgeons who do not find microincisional implantation challenging have said to me that they do not need AutoSert and that they have no problem inserting that tip. Once they try AutoSert, however, they realize that they have much more control over the lens insertion than with a manual injector. The delivery with AutoSert is much smoother and potentially much less traumatic to the incision, because the lens moves continually though the incision. In contrast, a manual injector pushes the IOL through the incision in short bursts, with rests in between, while the surgeon regrips the twist thread. This approach may cause some distortion of the incision. Colleagues and I recently completed a study to evaluate incisional stretch after the injection of IOLs with the Monarch injector versus the INTREPID AutoSert at its slow and fast settings.[4] We found significantly less stretching of the incision (0.1 mm) with the AutoSert on its faster setting, particularly with small incisions (Table 2). ■

Pre-injection Incision (mm)	1.9	2	2.1	2.2	2.3
Monarch III	0.17	0.15	0.10	0.11	0.07
Slow AutoSert	0.14	0.12	0.11	0.07	0.06
Fast AutoSert	0.10	0.09	0.03	0.04	0.03

Table 2. Comparative results: mean incision enlargement (mm). A recent study found the least incisional enlargement with the fast setting of the INTREPID AutoSert IOL Injector (4.4 mm/sec) vs the slow setting (1.5 mm/sec) and the manual MONARCH injector.[3]

David Allen, BSc, FRCS, FRCOphth, is a consultant ophthalmologist specializing in cataract surgery at Sunderland Eye Infirmary in Sunderland, United Kingdom. He has received travel and accommodation reimbursement and ad hoc honoraria from Alcon Surgical. Mr. Allen may be reached at allen401@btinternet.com.

1. Solomon KD, Lorente R, Cionni RJ, Fanney D. Prospective, randomized clinical study using a new phaco system with intraocular system target pressure control. Paper presented at: The ASCRS meeting; April 28, 2014; Boston, MA.
2. Centurion Vision System and AutoSert IOL Injector Handpiece Directions for Use. Alcon Laboratories, Inc.; Fort Worth, TX.
3. Allen D. Effectiveness of high vacuum versus lower vacuum with new phacoemulsification console with active fluidics. Paper presented at: The ASCRS meeting; April 28, 2014; Boston, MA.
4. Allen D, Habib M, Steel DHW. Final incision size after implantation of a hydrophobic acrylic aspheric intraocular lens: new motorized injector versus standard manual injector. *J Cataract Refract Surg.* 2012;38:249-255.

CENTURION® Vision System Important Product Information

CAUTION: 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 SN60WF, 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.

The consumables used in conjunction with ALCON® instrument products constitute a complete surgical system. Use of consumables and handpieces other than those manufactured by Alcon may affect system performance and create potential hazards.

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 and Operator's Manual for a complete listing of indications, warnings, cautions and notes.

INFINITI® Vision System Important Product Information

CAUTION: Federal 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 INFINITI® Vision System is indicated for emulsification, separation, and removal of cataracts, the removal of residual cortical material and lens epithelial cells, vitreous aspiration and cutting associated with anterior vitrectomy, bipolar coagulation, and intra-ocular lens injection. The INTREPID® AutoSert® IOL Injector Handpiece is intended to deliver qualified AcrySof® intraocular lenses into the eye following cataract removal.
The following system modalities additionally support the described indications:
- Ultrasound with UltraChopper® Tip achieves the functionality of cataract separation.
- AquaLase® Liquefracture Device achieves the functionality for removal of residual cortical material and lens epithelial cells.
- The INTREPID® AutoSert® IOL Injector Handpiece achieves the functionality of injection of intraocular lenses. The INTREPID® AutoSert® IOL Injector Handpiece is indicated for use with AcrySof® lenses SN60WF, 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 INFINITI® 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.
Adjusting aspiration rates or vacuum limits above the preset values, or lowering the IV pole below the preset values, may cause chamber shallowing or collapse which may result in patient injury.
When filling handpiece test chamber, if stream of fluid is weak or absent, good fluidics response will be jeopardized. 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.
The consumables used in conjunction with ALCON® instrument products constitute a complete surgical system. Use of consumables and handpieces other than those manufactured by Alcon may affect system performance and create potential hazards.

AEs/COMPLICATIONS: Use of the NeoSoniX®, OZil® torsional, U/S, or AquaLase® handpieces in the absence of irrigation flow and/or in the presence of reduced or lost aspiration flow can cause excessive heating and potential thermal injury to adjacent eye tissues.

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

ProVisc® OVD Important Product Information

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

INDICATION: ProVisc® 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.

CONTRAINDICATIONS: At present there are no known contraindications of the use of ProVisc® Ophthalmic Viscosurgical Device when used as recommended.

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.
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 decompensation, 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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