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Removing Dense Cataract With the CENTURION Vision System

Demonstrating technological advances.

BY KHIUN F. TJIA, MD

As a member of the first group of surgeons to evaluate the CENTURION Vision System (Alcon Laboratories, Inc.) during its development, I have used the system through all of its iterations before its commercial launch. I have switched to the CENTURION Vision System because this innovative phaco machine provides superior efficacy and safety compared with the INFINITI Vision System (Alcon).

TECHNOLOGICAL ADVANTAGES

The CENTURION Vision System offers two innovations that I consider groundbreaking for cataract surgery. The first function is its ACTIVE FLUIDICS Technology, which allows the surgeon to perform surgery at a low IOP that I firmly believe is more within the eye's appropriate physiological range. I can preset the CENTURION Vision System to maintain my target IOP, which currently is 36 mm Hg. In my practice, I strive not to let the eye exceed 50 mm Hg or higher for more than 5 minutes. With older phaco systems, the IOP would constantly fluctuate depending on the manipulations in the eye. With the CENTURION Vision System, I can perform almost the entire surgery at a near physiological IOP. Another important improvement is the unique, low-compliance fluidic management system that is designed to significantly reduce occlusion break surge and ensure stability of the anterior chamber, even at high vacuum settings. I work with 500 mm Hg of vacuum, which provides more holding power as well as very efficient phacoemulsification and aspiration. The following case, the video of which is available at http://eyetube.net/video/tjia-centurion-case-review/, showcases the power and efficiency of the CENTURION Vision System.

The second groundbreaking innovation with this system is Balanced Energy. A new double-curved shaped phaco tip has been specifically designed to optimize the efficiency and safety of Torsional ultrasound.

Phaco Stroke - OZil Amplitude Comparison			
Stroke/ Amplitude at 100% Power	**Traditional Phaco**	**Kelman Miniflared**	**Balanced Mini**
At Cutting Edge	**89 µm (Torsional)**	**130 µm**	**192 µm**

Table 1. The INTREPID Balanced Mini Tip (Alcon) allows for nearly twice the lateral movement of other phaco tips.

The INTREPID Balanced Mini Tip's design enables approximately 50% more lateral movement compared to previous tips, and it cuts more easily through very dense lens material (Table 1). This allows me to reduce the maximum set amplitude to 65% during quadrant removal.

The tip is designed to transfer energy to its distal end. Longitudinal ultrasound intrinsically induces phaco tip friction against the sleeve, potentially resulting in unwanted wound changes. Kelman tips in combination with Torsional ultrasound also show tip shaft motion at the level of the incision.

CASE PRESENTATION

This case involved a grade 3 nucleus. Although not brunescent, it was certainly denser than an average cataract. Because I work in a teaching hospital, I use standard surgical techniques in cataract surgery. After making the initial incisions, I inject Viscoat OVD (Alcon). This dispersive viscoelastic coats and protects the corneal endothelium, which is particularly important with denser cataracts and/or compromised corneal endothelium cases. I have noticed that, since I began using the CENTURION Vision System, more Viscoat OVD remains in the eye when I am done performing phacoemulsification.

Please see page 3 for important information about these products.

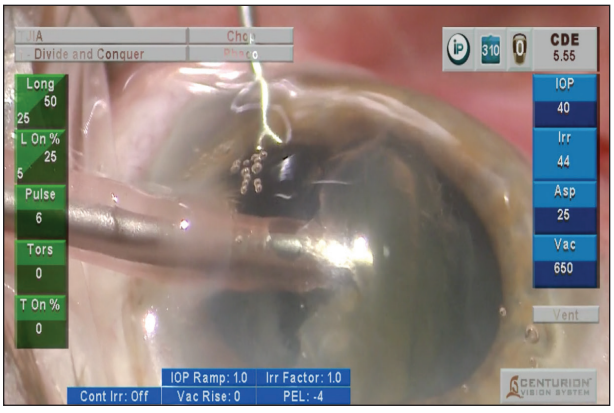

Figure 1. The INTREPID Balanced Mini Tip demonstrates great holding power yet contributes to low IOP in the setting of high vacuum.

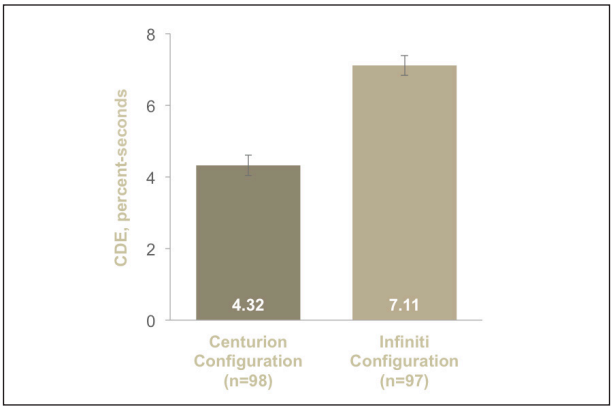

Figure 2. In one study, the CENTURION Vision System showed less observed CDE compared with the INFINITI configuration. The mean difference between the groups was -2.78 percent-seconds.[1]

CAPSULORHEXIS AND NUCLEAR DISSECTION

I created my standard manual capsulorhexis, which I aim to be smaller than the IOL optic size, and then I performed hydrodissection. I approached nuclear disassembly in this case with a straightforward divide-and-conquer technique.

I have optimized this divide-and-conquer technique with less sculpting than the original technique. After creating an initial groove, I hemicrack the nucleus. I subsequently impale the heminuclei in the middle and crack them straight away without additional sculpting (Figure 1). I then introduce the INTREPID Balanced Mini Tip, and during sculpting and quadrant removal, one can witness the increased emulsification efficiency and the absence of any significant tip movement inside the incision. One can also see the lack of any signs of anterior chamber instability. There is no iris trampolining, posterior capsule movement, etc., and this stability of the anterior chamber is designed to be maintained while using high vacuum settings and a low target IOP!

Since switching to the CENTURION Vision System with the INTREPID Balanced Mini Tip from the INFINITI Vision System with the Mini tip, I have seen a 30% to 40% decrease in my cumulative dissipated energy during phacoemulsification. A recent comparison study conducted by Solomon et al found a similar rate of energy reduction (Figure 2),[1] and I presented a paper on this improvement at the 2014 ASCRS meeting in Boston as well.[2]

CORTICAL CLEANUP AND IOL IMPLANTATION

The next step in this case was cortical cleanup, for which I inserted the bimanual polymer I/A tip (Alcon) into the eye. In Europe, bimanual I/A is much more popular than coaxial, and interestingly, the bimanual technique is experiencing a resurgence of sorts in the United States with the advent of femtosecond cataract surgery. I advocate hollow, disposable instruments for I/A[3]; I prefer to use a soft polymer I/A tip as opposed to a metal one for polishing the capsule.

For IOL implantation, I prefer a cohesive viscoelastic (Provisc OVD; Alcon), which is easy to remove at the end of the case. To inject the IOL, I used the INTREPID AutoSert IOL Injector (Alcon), which provides a controlled implantation without any jerky movements. This device, which is operated via a foot pedal, controls every step of the IOL injection process at the surgeon's chosen speed. In my experience, single-handed push injectors can sometimes expel the IOL too fast and create the possibility of harming delicate intraocular tissue. Two-handed screw-type injectors often involve some manipulation and/or rotation within the incision. The INTREPID AutoSert IOL Injector is simple to use; the surgeon simply holds it steady just inside the incision while the IOL advances into the eye. ■

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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. Tjia KF. Novel balanced phaco tip for microcoaxial torsional phaco. Paper presented at: The ASCRS meeting; April 27, 2014; Boston, MA.
3. Scharioth GB, Tjia KF. Benefits of a disposable I/A cannula. *Cataract & Refractive Surgery Today Europe.* Available at: http://bmctoday.net/crstodayeurope/2013/06/article.asp?f=benefits-of-a-disposable-ia-cannula. Accessed June 9, 2014.

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.

VisCoat® OVD Important Product Information

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

INDICATION: VISCOAT® OVD is indicated for use as a surgical aid in anterior segment procedures including cataract extraction and intraocular lens (IOL) implantation. VISCOAT® OVD maintains a deep chamber during anterior segment surgeries, enhances visualization during the surgical procedure and protects the corneal endothelium and other ocular tissues. The viscoelasticity of the solution maintains the normal position of the vitreous face and prevents formation of a flat chamber during surgery.

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

WARNINGS/PRECAUTIONS:
• Failure to follow "Directions for Use" on attachment of the cannula or use of an alternate cannula may result in cannula detachment.
• 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.
• 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 effect such a rise. It is therefore recommended that VISCOAT® OVD be removed from the anterior chamber by thorough irrigation and/or aspiration at the end of the surgery to minimize postoperative IOP increases. Do not overfill anterior chamber.

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

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