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CENTURION Vision System: My Experience

Experience with torsional energy.

BY DANIELE TOGNETTO, MD

I have been using INFINITI Vision System with OZil technology since it was launched in 2006. From my first hours, I noticed a significant improvement in followability and a reduction in repulsion compared to my experience using longitudinal phacoemulsification.[1] At that time, I got the impression that this torsional tip movement was an innovation in cataract removal surgery. Over time, I have come to believe the torsional modality leads to a reduction in ultrasound time (UST) and cumulative dissipated energy (CDE) compared to longitudinal modality,[1-3] since the torsional tip movement can result in less chattering of material at the tip as the back-and-forward movement of longitudinal modality is replaced by the side-to-side tip movement of torsional modality. The reduction of chattering[4,5] leads to an increase in removal efficiency of the cataract removal procedure.[1,2,6]

The use of the torsional ultrasound modality has been associated in the literature with a reduced loss of endothelial cells and tissue damage compared to the traditional longitudinal modality's literature.[1,2,6] Also, the thermal profile of the tip's movement has been shown to be lower using the torsional modality over the longitudinal modality.[7,8]

In 2012, colleagues and I published in the *Journal of Cataract & Refractive Surgery* a study entitled, "Stroke Dynamics and Frequency of 3 Phacoemulsification Machines,"[9] in which we compared the working frequency and the stroke dynamics of the phaco tip for three different systems. In contrast to other phaco delivery systems, The INFINITI Vision System with OZil technology showed a progressively increasing lateral movement according to the increased phaco power, almost without any longitudinal movement, both at the end of the tip and at the incision site.

The torsional tip's movement may provoke a kind of "fogging" effect due to the pulverization of the lens material, reducing visibility in the anterior chamber. Also, high-vacuum procedures using flared or tapered tips may lead to material not moving completely through the tip. This occlusion by small, hard lens fragments could make it necessary to stop the procedure and clear the obstruction. These effects were overcome in 2009 with the innovative OZil IP (Intelligent Phaco) software (Alcon). This enhancement helps surgeons avoid strong occlusions by using a longitudinal pulse of energy to produce a burst of repulsion when a preset vacuum threshold is reached.[10,11]

In my clinic's operating theater, we use different phaco machines. I exclusively use INFINITI Vision System with OZil IP. I was impressed by the efficiency and performance of this machine; so much so, I did not think that we could get any better.

MY EXPERIENCE WITH CENTURION VISION SYSTEM

In 2013, Alcon launched the CENTURION Vision System. From my early experience with the CENTURION Vision System, I feel it provides two main technical innovations that make this system unique and revolutionary:

- The Active Fluidics Technology
- The CENTURION Energy Delivery, especially utilizing the INTREPID BALANCED Tip

ACTIVE FLUIDICS TECHNOLOGY

In the CENTURION Vision System, the Active Fluidics technology means that the irrigation inflow is not passively linked to the static height of the bottle, but is controlled by dynamic compression of a soft bag by a plate inside the system. This allows the CENTURION Vision System to rapidly detect and compensate for dynamic changes that affect the anterior chamber, leading to enhanced chamber stability.

The rapid compensation is governed by the information derived from a combination of a vacuum sensor placed along the aspiration line, the known flow rate, and by a pressure sensor placed along the irrigation line. This technology, which responds to very small changes in pressure, allows the surgeon to select the target pressure inside the eye throughout the procedure. The system also incorporates a unique low-compliance design that reduces the storage of potential energy and postocclusion surge. This allows two surgical advantages: enhanced control of intraocular pressure throughout all stages of the procedure, and the option to operate at a lower surgical target pressure.

CENTURION ENERGY DELIVERY

The second innovation of CENTURION Vision System is in energy delivery. I used the CENTURION Vision

Please see page 3 for important information about these products.

Advanced-Technology Cataract Surgery

CENTURION VISION SYSTEM ENERGY DELIVERY

CENTURION Energy Delivery combines existing and new capabilities to enhance the efficiency of cataract removal:

1. The Active Fluidics capabilities of CENTURION Vision System.
2. OZil torsional technology (including OZil IP).
3. And especially with the enhanced performance of the BALANCED tip.

With the CENTURION Vision System, in addition to the Active Fluidics technology designed to maintain chamber stability, the surgeon can choose CENTURION Energy Delivery capabilities in aspiration and vacuum to help

- bring materials to the tip;
- have materials at the tip behave the way the surgeon prefers;
- move material through the tip.

With INFINITI Vision System, vacuum and aspiration can be linear (or fixed) in foot pedal position 2 (FP 2). In FP 3, the surgeon-selected parameters are always fixed.

With the CENTURION Vision System, vacuum and aspiration can be linear (or fixed) in FP 2 and, can be either:

- Fixed in FP 3: Like INFINITI Vision System
- Decreasing in FP 3: This ability, unique to CENTURION System, allows the surgeon to reduce vacuum and flow while applying phaco energy. It is designed to reduce the surge at the occlusion break.
- Increasing in FP 3: This ability, unique to CENTURION System, allows surgeon to "grab" and "hold" fragments for repositioning and the next round of phaco and aspiration.

These choices help the surgeon achieve his or her preference regarding how to manage the interaction of bringing materials to the tip (via aspiration), holding material to allow desired repositioning (vacuum), along with emulsification and repulsion of material at the tip (phaco energy delivery), and finally removal from the anterior chamber (aspiration), with a wider range of choice than is available on INFINITI Vision System. The result is the desired use of cumulative dissipated energy (CDE) needed to achieve cataract removal efficiency.

These capabilities are added to the OZil IP (Intelligent Phaco), where a surgeon-selected amount of longitudinal energy can be employed to provide momentary repulsion when a vacuum threshold is achieved.

All the above work with all of the Alcon phaco tips. However, due to the design of the BALANCED tip, where the energy is focused at the distal end of the tip and the torsional amplitude is greater, the level of efficiency achieved is further enhanced.

System with the INTREPID BALANCED tip, an innovative design that has been specifically designed to enhance the characteristics of the OZil torsional motion. The INTREPID BALANCED Tip has two opposite bends along its axis, with an overall profile similar to a straight tip. The maximum lateral stroke of the tip is equal to 180 µm, significantly higher than the typical Kelman tip, whose stroke can reach 120 µm. The inner diameter of the tip is 0.57 mm, and the outer diameter is 0.8 mm, without any tapering or flaring along the length of the tip.

In my early experience with the CENTURION Vision System using this tip, I was impressed by its efficiency. The lenticular fragments seem to disappear once engaged by the tip. The rapidity of the removal of the lens goes hand-in-hand with the stability of the anterior chamber. The efficiency of the tip allows me to dissolve hard cataracts in a very short time without the use of high amounts of energy. I felt confident with a stable anterior chamber and had a sense of control throughout the procedure.

EXPERIENCE WITH INTREPID BALANCED TIP

In order to test the effectiveness of the CENTURION Vision System with the INTREPID BALANCED tip, we removed some hard cataracts. We first divided the nucleus into two parts, and then removed the first half using the Mini Flared Kelman Tip and the second half using the INTREPID BALANCED tip. The total phaco time was noticeably shorter using the INTREPID BALANCED tip,[12] which demonstrated the great efficiency of the new system and tip.

In my opinion, CENTURION Vision System advances the technological frontier in the field of cataract surgery. Its use will be of a benefit for a wide range of surgical procedures for surgeons of all levels of experience. ■

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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

Caution: Federal law restricts this device to sale by, or on the order of, a physician.

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.
- 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.

AEs/Complications: Use of the INFINITI® Vision System 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.

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