OZil IP Torsional Ultrasound in a Grade 2 Nucleus

To watch a video of this case, visit CRSTodayEurope.com and enter the keyword "RTBOshima" in the search bar.

BY YUSUKE OSHIMA, MD, PhD

I began using OZil torsional ultrasound on the INFINITI Vision System (Alcon Laboratories, Inc., Fort Worth, Texas) more than 3 years ago at the university where I work and in my private practice. Previously, I used traditional longitudinal ultrasound on the INFINITI platform, and I tested the OZil handpiece after seeing demonstrations of the torsional technology enabling more efficient phacoemulsification with reduced energy output. Currently, I perform approximately 1,500 cataract surgeries and 500 phaco-vitrectomies per year using the OZil system, and it is the only phaco technology I use.

MOST EFFICIENT ENERGY USAGE

In the past year, I adopted the Intelligent Phaco (IP) software, which has improved the performance of OZil torsional ultrasound with all grades of cataracts. Without the IP technology, I sometimes encountered difficulty with cracking very dense nuclei and their fragments occluding the phaco tip. I found myself reverting back to traditional ultrasound to complete phacoemulsification of these lenses. For the densest lenses, I would use OZil torsional ultrasound for about 200 ms and then switch to longitudinal ultrasound for 10 to 20 ms. Since obtaining the IP software, I use 100% torsional ultrasound for all nuclear densities because I find it the safest and most efficient method.

My colleagues and I conducted a series of studies to compare the performance of the original OZil torsional ultrasound, OZil IP, and traditional longitudinal ultrasound performed on the INFINITI platform. The first study was a prospective one in which we randomized the patients between the three phaco technologies and compared the CDE, the total energy output, the total phaco time, and the loss of endothelial cells. We expected that OZil torsional ultrasound alone would require much less energy than OZil IP, because the IP uses some longitudinal energy. Instead, we were surprised to find that OZil IP used the least amount of

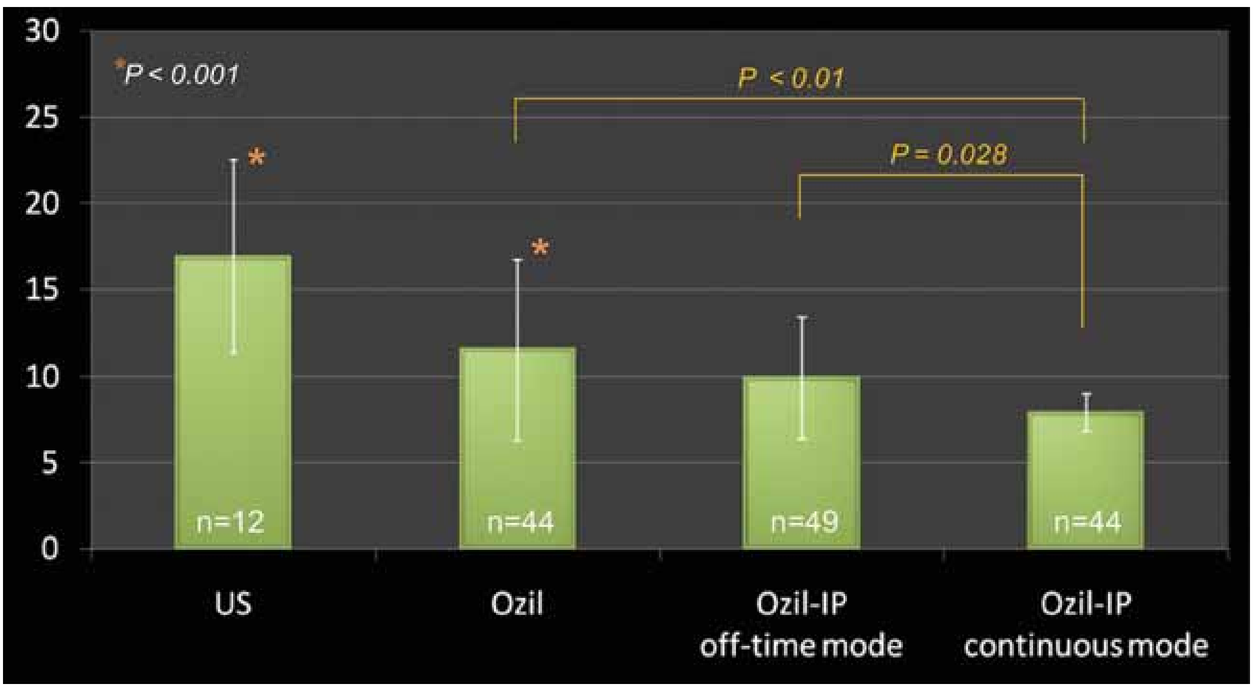

Figure 1. A comparison of the cumulative dissipated energy (CDE) values among different parameters used for disassembling nuclei softer than grade 3. The OZil IP continuous mode used the least amount of energy for nuclear disassembly, even in eyes with soft cataracts.

TABLE 1. PARAMETERS

Procedure Step	Chop & Fragment Removal
Bottle Height cm H_2O	90
Energy min%/max%	Torsional, Continuous 0/100
Vacuum mm Hg	250 linear
Aspiration cc/min	35 fixed
Dynamic Rise	0
OZil IP	On

TABLE 2. OZIL IP PARAMETERS

Procedure Step	Chop & Fragment Removal	
Nucleus grade	< 2	≥ 3
Vacuum threshold % of Vacuum Limit	90	90
Phaco Pulse On Time Ms	5	10
Longitudinal/Torsional Ratio	0.7	0.9

energy during every step of the surgery, even with soft cataracts (Figure 1). OZil IP was also the most efficient technology for nuclear disassembly (using a cracking technique). Considering these advantages, my colleagues and I concluded that we should only perform surgery with OZil IP.

TECHNIQUE AND SETTINGS

I feel that a chopping technique is the most efficient approach to nuclear disassembly with OZil torsional ultrasound, even with soft cataracts, as the corresponding video shows. I prefer to chop the nucleus into several small fragments to make phacoemulsification as fast as possible.

My OZil torsional ultrasound parameters are very simple (Table 1); I only use one setting. I use continuous torsional energy from 0 to 100%, and I control the energy delivery with the foot pedal. I set the IP to activate at a threshold of 90% occlusion and to remain on for 5 ms. Surgeons may set the IP to remain on for 10 ms if they prefer, however. My longitudinal/torsional ratio depends upon the hardness of the nucleus. For nuclei softer than grade 2, my ratio is 0.7; harder than grade 3, my ratio is 0.9 (Table 2). Again, I can use these settings for grade 4 to 5 cataracts by chopping the nucleus to very small fragments. Based on other studies my colleagues and I have conducted, I feel these settings use the lowest amount of energy and preserve the most endothelial cells with the OZil IP technology.

CASE EXAMPLE

This case is of a 56-year-old woman with a grade 2 nucleus in her right eye. She wished to receive an AcrySof IQ ReSTOR IOL as part of the cataract surgery. Therefore, my goal was to use the least amount of ultrasonic energy in order to preserve as many endothelial cells as possible.

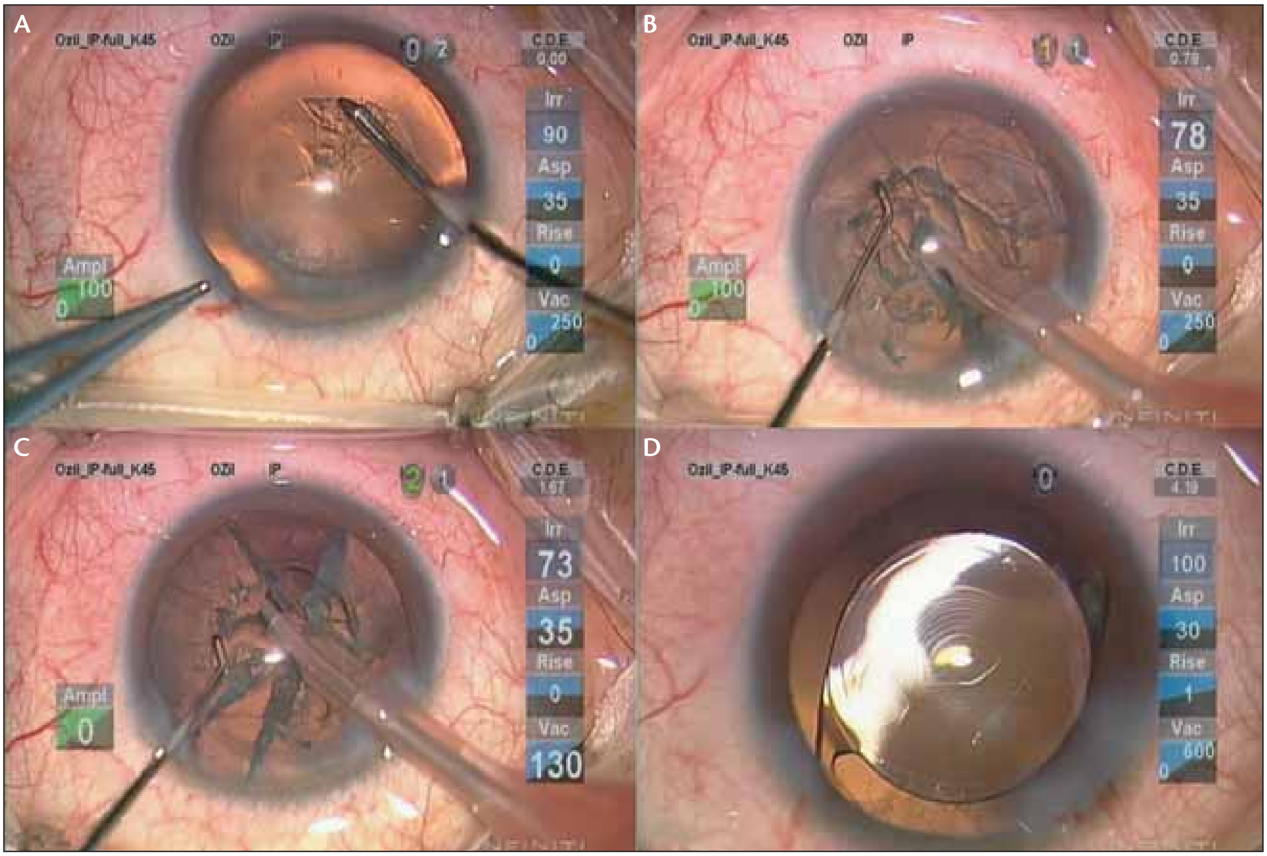

Figure 2. The author creates the capsulorhexis using an Ikeda micro capsulorhexis forceps through a 2.2-mm clear corneal incision (A). He performs the phaco chop technique with a Miyoshi chopper (B). The author disassembles the nucleus with a 45º KELMAN Mini Flared tip (C). The angled tip works congruently with the side-to-side sweeping motion of the OZil handpiece. At the completion of the surgery, the AcrySof IQ ReSTOR IOL is well positioned and completely covered by the 5.5-mm capsulorhexis (D).

I began the surgery by applying topical anesthesia with 4% lidocaine. Then, I made a 2.2-mm clear corneal incision superortemporally. Because a 2.2-mm incision minimizes surgically induced astigmatism to subclinical levels, I no longer use a temporal approach; instead, I usually sit at the patient's head to perform surgery. Next, I instilled DisCoVisc ophthalmic viscosurgical device (Alcon Laboratories, Inc.), which I feel is adept at maintaining the depth of the anterior chamber and provides excellent visualization of the anterior capsule during the procedure. I also feel that the chondroitin sulfate in DisCoVisc OVD provides excellent corneal protection because of its ability to stay in the eye during removal of the cataract.

As all cataract surgeons know, it is very important to create a round, well-centered capsulorhexis to keep the IOL positioned and prevent it from decentering. I use an Ikeda micro capsulorhexis forceps available from Eye Technology Ltd. (Essex, UK) (Figure 2A). I began the tear from the clear corneal incision and created a 5.0 to 5.5-mm capsulorhexis (a little bit smaller than the diameter of the IOL's 6-mm optic). Then, I commenced nuclear disassembly using my chopping technique and a microcoaxial approach. In my left hand, I used a Miyoshi chopper (Geuder AG, Heidelberg, Germany), which is slightly angled and makes it easy to chop from the direction from which I operate (Figure 2B). I also find this chopper useful for rotating the nucleus during phacoemulsification.

For phacoemulsification, I used the 45º KELMAN Mini Flared tip on the OZil handpiece. My colleagues and I conducted a study to compare the 30º versus the 45º KELMAN tip, and we found the 45º tip to be much more efficient with a much lower CDE with OZil IP (unpublished data). Because this was not a hard cataract, I chopped it into only four quadrants (Figure 2C). I usually break denser nuclei into eight or more fragments, because again, it is easier to aspirate smaller particles. My OZil torsional ultrasound settings made this cracking and aspiration step very fast. As usual,

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> —*Dr. Oshima*

OZil IP decreased my surgical time compared to what I used to need with longitudinal ultrasound. Phacoemulsification is usually the longest step in cataract surgery, but the OZil IP technology has shortened my effective phaco time and increased my surgical efficiency so that I now routinely perform 20 to 25 cataract surgeries per day.

After completely removing the nucleus, I used I/A to aspirate the residual cortex. I polished the backside of the anterior capsule to remove the epithelial cells as much as possible in preparation for implanting the advanced-technology IOL. I inserted the AcrySof IQ ReSTOR IOL with a 6-mm optic through a 2.2-mm incision using the Royale Injector (ASICO LLC, Westmont, Illinois) with the MONARCH D cartridge (Alcon Laboratories, Inc.). After implanting the IOL, I usually insert the I/A tip behind the IOL to thoroughly wash out the residual OVD from the capsular bag. I make sure to use sufficient intraocular irrigation to prevent bacterial contamination as well as to keep the IOP from rising postoperatively. At the end of surgery, the capsulorhexis kept the lens well positioned (Figure 2D).

The patient's outcome was very nice. One day after surgery, she achieved 20/20 UCVA in the right eye, both at near and intermediate. The patient reported that her reading vision was very comfortable. This kind of feedback is why I routinely implant the AcrySof IQ ReSTOR IOL.

SURGICAL TIPS

I feel that the most efficient and energy-saving surgical technique with OZil IP torsional ultrasound is to chop the nucleus into small fragments (four to eight, depending on the density). I have heard some cataract surgeons say that they prefer traditional longitudinal phacoemulsification, because they fear that the angle of the OZil tip may too easily catch the posterior capsule. As my accompanying video shows, however, the angled OZil tip works congruently with the side-to-side sweeping motion of the OZil handpiece. ■

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