

Seventh annual Alcon Foresight meeting



Raj Narayanan, Region President, Alcon Asia

Alcon hosted its seventh Foresight meeting in Seoul, South Korea, 2–3 June 2018, gathering about 300 delegates, which made it the largest Foresight meeting to date, according to **Raj Narayanan**, Region President, Alcon, Asia. Before the meeting delved into general and specialized sessions, Mr. Narayanan discussed “Who are we here for?”

“I think that all of us in this room have a shared vision and a shared purpose and that is to help people see better,” Mr. Narayanan said. “... While significant advances have been made in the field of ophthalmology, I think there is a lot more that needs to be done. While on the one hand we’re very proud that ophthalmics has touched the lives of millions of people each year, we’re also humbled to know there are about 300 million people whose lives, whose sight can be better with better care and better treatment.”

Even still, Mr. Narayanan continued, people are living

longer and aspire to be fully functional throughout their life span, which he said motivates Alcon to “drive innovation, to drive technology to create better products that can meet their needs. Both of these together can give us our purpose, our mission, which is to discover new ways to enhance sight and improve people’s lives.” Alcon offers a wide spectrum of pharmaceuticals, devices, and technologies for all parts of eyecare.

“But we are not resting on our laurels. We understand that what you need is innovation. You are constantly in need of better products that will help you deliver the better outcomes for your patients, and that is the core to everything that we do at Alcon,” Mr. Narayanan said, adding the company spends \$500 million on research and development annually and in the Asia-Pacific region alone, the company received 46 regulatory approvals within the first quarter of 2018.

Many of the ideas for innovation come from discussions with ophthalmologists. **Robby Palmer**, Director,



Panel of speakers at the Video Symposium

Regional Medical Affairs Surgical, Alcon, Asia, presented a few of these novel innovations that are either in the pipeline or have been recently delivered to the Asia-Pacific market. The first was the Clareon monofocal IOL and AutoNoMe delivery system. The Clareon IOL consists of a new lens material and bio-optics with stable-force haptic design. These features allow for stable lens positioning after implantation; a reduced rate of positive dysphotopsias, glistenings, surface haze, and posterior capsule opacification; and good postop visual acuity and outcomes.

“Clareon is a new lens material providing unsurpassed optical clarity and a novel, hydrophobic, acrylic material, and a new advanced manufacturing process. These advancements are to provide a better quality IOL to give your patients more clarity in their vision,” Mr. Palmer said.

AutoNoMe is considered first-of-its-kind as a fully automated, single-use, disposable IOL delivery system that uses a CO₂ cartridge for controlled, consistent delivery.

The inserter comes preloaded with Clareon, is designed for single-hand use with a responsive speed control lever, and features comfortable ergonomics. It also carries Alcon’s proprietary depth guard and a 3-mm nozzle tip for through-the-wound delivery, which help maintain wound size.

David Eister, Global Director for cataract, Alcon, U.S., spoke about innovations in equipment for cataract surgery, highlighting the Centurion Vision System with Active Sentry. This system includes a new sensor-equipped handpiece, new hardware and software, and improvements in the fluidics management system (FMS), or the consumable. This system allows occlusion break to be sensed and responded to in real time.

“Once we sense the event, we can now react faster than we’ve ever been able to before,” he said. “By changing the fluid coming from the machine and being withdrawn, we’re able to

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interact within the time window of the event.”

In addition to better management of occlusion break and a reduction of negative consequences that could be associated with it, the system allows for wound leakage compensation through active IOP management and provides consistency to the surgeon from case to case, regardless of the patient’s head position.

Mr. Eister discussed a new, hybrid phaco tip, which will be deployed with Centurion packs, and the Legion System, a tabletop, gravity-only phacoemulsification system that operates with OZil and is expected in 2019.

“Over the last 2 years, we have remade the portfolio of

Alcon cataract equipment. We now have three offerings that will meet what your needs are in your situation,” Mr. Eister said. “Our intent is to make sure that we provide you the best-in-class product no matter what you choose to purchase.”

Other Alcon innovations that were presented included Contoura Vision for topography-guided LASIK, StreamLight for transepithelial PRK, and image-guidance with VERION and ORA.

In addition to driving innovative products, Mr. Narayanan said the success of those advances depends on education. Alcon already has a strong emphasis on education, but it recently launched the Alcon Experience Acad-

emy, which brings all of its educational initiatives under one umbrella.

“We’re bringing it together so that you get a consistent structured education program, irrespective of which market you are in,” he said.

The flagship of Alcon’s educational efforts, Mr. Narayanan noted, is its Phaco Development Program, which is celebrating its 10th anniversary, having trained more than 2,400 ophthalmic surgeons across Asia who have gone on to treat more than 2.4 million eyes.

“To conclude, I want to give you three key messages, that is, our commitment,” Mr. Narayanan said. “Together with you, Alcon is committed to improving sight

and ensuring that people can see better. We want to be the most trusted partner to all of you. Alcon celebrated our 70th year last year, so we have a rich heritage. Through this we have earned your trust, and we’re going to work hard to keep and build and maintain that trust. We want you to see us as your most trusted partner. Through the promise that we offer, through the educational services that we offer, and all the services that we offer, we’d like to help you advance patient eyecare.”



Attendees of the seventh Foresight meeting in Seoul, South Korea

Hot topics in ophthalmology



Hot Topics in Ophthalmology session

Ophthalmology is constantly changing and evolving to improve patient care and outcomes. Some of these hot topics were specifically addressed by Foresight faculty.

Posterior capsule rupture, a stuck IOL, a damaged haptic, for example, are all issues that **Abhijeet Desai, MD**, Mumbai, India, has had with manually loaded IOL inserters.

“We needed to have an ideal, preloaded IOL delivery injection system,” Dr. Desai said, explaining that such a system would be inserted through a small and maintained incision with smooth passage of the IOL and surgeon ease of use.

In his clinical experience, Dr. Desai said the AcrySof UltraSert preloaded IOL delivery system offers all of these features.

“Why should we incorporate preloaded IOLs into our surgical theater? It boosts the efficiency, predictability, and safety,” Dr. Desai said, noting several studies that have found lower incidence of endophthalmitis rates with preloaded IOLs, decreased case time, and increased sur-

geon output, overall, due to maximized efficiency.

Dr. Desai favors the AcrySof UltraSert delivery system due to its depth guard, which prevents corneal-scleral wound stretch, and its lens-stop guard, which protects the IOL during transportation and doesn't allow the IOL to move during OVD injection. It also features a stop to prevent the plunger from coming into contact with the IOL and a spring-controlled mechanism.

In the 2 years that he's been using the UltraSert, Dr. Desai has not had a case of an IOL sticking to the plunger or haptic sticking to the optic. In a study of 28 eyes, he saw no wound extension, no sticking haptic to the plunger, and no expulsive injection. What's more, all IOLs were implanted into the bag upon first attempt, Dr. Desai said.

In addition to these benefits, Dr. Desai has found UltraSert avoids postop cleaning and calibration needed with reusable IOL injection systems, and it eliminates handling, mislabeling, sterility, and dropped IOL issues that can be associated with manual systems. “Preloaded systems will ultimately be-



Michael Lawless, MD

come the preferred method of delivery with added convenience and efficiency associated with it,” Dr. Desai said.

Chee Soon Phaik, MD, Singapore, also shared her experience with the AcrySof platform, specifically PanOptix and PanOptix toric IOLs. The PanOptix IOL, though a trifocal, Prof. Chee said, solves some of the limitations seen with other trifocals by utilizing non-apodized, quadrifocal diffractive design, or ENLIGHTEN technology. It provides higher light utilization and sends energy to all three focal points with less dependence on pupil size, Prof. Chee said.

An audit by the Singapore National Eye Center of the PanOptix and PanOptix Toric revealed that 38.6% of toric lenses were 6/6 unaided visual acuity (UAVA) at distance and 32% of non-torics met this mark; 100% toric lenses achieved at least 6/9 and 94% of non-torics achieved 6/9. At 35–40 cm near UAVA, 96.3% of toric lenses and 89.4% of non-torics were N5 or better. At 60–80 cm, 61.9% of torics and 58.7% of non-torics saw N5 or N6, Prof. Chee said.

“We are looking at how the patient functions unaid-

ed ... and you will see if a patient can hit 6/9, generally, he'll come in and smile at you. If he's 6/12, he's not happy. I think it is important for these multifocal lenses to be able to hit that distance target,” Prof. Chee said. “If you can get the patient to see well at distance, generally they're happy, even if they struggle a little at intermediate or near.”

Prof. Chee also discussed the benefits of binocular implantation of these lenses, finding better functional vision and contrast sensitivity compared to monocular. Prof. Chee said glare and halo, the common complaints associated with multifocal IOLs, improve by 6 months postop. Glare is seen far less than halo in these lenses. Prof. Chee said she hardly talks about contrast issues with patients but always mentions the possibility of seeing halos.

Compared to other multifocal lenses on the market, Prof. Chee said that near vision is the strongpoint of this lens with good intermediate vision and better refractive predictability and contrast sensitivity.

Optimizing cataract surgery outcomes with advanced technologies



Cesar Espiritu, MD, moderating the session



Panel of speakers at the Cataract session

From femtosecond lasers to phacoemulsification systems to image-guidance systems, there are many opportunities for cataract surgery to be optimized with advanced technologies.

Michael Lawless, MD, Sydney, Australia, said more than two-thirds of cataract cases at his practice involve the LenSx Laser System. "LenSx alone will not make you happy. I think that's important to recognize. Happiness is 90%-plus of patients within 0.5 D of spherical equivalent and cylinder," he said.

Dr. Lawless achieves this goal in 93% of his patients, but how does he get there? Standardization, he said, which is, in part, made possible with the LenSx laser. Not only is the LenSx capsulotomy strong and reproducible, Dr. Lawless cited studies that show less vitreous loss for surgeons after they converted to femtosecond laser-assisted cataract surgery (FLACS) and a complication rate similar to that of manual phaco cases

with a trend toward a lower rate in FLACS cases.

The safety of FLACS is a given, Dr. Lawless said, adding that its value comes with capitalizing on its consistency and reproducibility. Use of the LenSx laser, for example, is one of his "seven essentials for happiness." It gives him the opportunity to exactly size and place the capsulotomy where he wants it. Other essentials include use of the Centurion Vision System for superior chamber stability, tear film optimization, biometry with the correct formulae, use of Verion and digital alignment in his toric patients, and use of PanOptix trifocals, which he implants in 25% of his patients. An adequate preop conversation with patients to set expectations is important as well.

"This is all trying to get from the top to the tippy top," Dr. Lawless said. "It's a hard climb ... but I think patients appreciate getting right on target rather than close to it."

Zhao Ping, MD, Shenyang, China, shared the learning curve of his first 100

FLACS cases, which he began performing in 2017. Most of his complications specifically related to FLACS occurred in these first 100 cases and decreased substantially from there. These included issues created by the docking-suction cup (conjunctival hemorrhage, decentration, and suction break); incomplete or too anterior of femtosecond laser-created incisions; incomplete or decentered capsulotomy; miosis; and unsuccessful lens fragmentation.

After getting over the learning curve, Dr. Ping said FLACS has become preferred in his refractive IOL cases and some challenging cases.

When it comes to the actual phacoemulsification procedure, **Allan Fong, MD**, Singapore, sees value in the dynamic IOP management and enhanced anterior chamber stability offered with active fluidics in the Centurion Vision System.

"During every case, flow rates vary. Unlike gravity and pressurized fluidics, active fluidics technology detects and compensates to help maintain the surgeon-selected

IOP," Dr. Fong said, specifically discussing the switch from the INFINITI Vision System to Centurion at the Singapore National Eye Center, which took place beginning in 2015. "The switch from INFINITI to Centurion was remarkably easy for most of us at our center. It's faster and, more importantly, it feels safer and is more efficient."

Active fluidics, Dr. Fong explained, allows the surgeon to work at a consistent, physiological IOP range with less risk of surge or unstable anterior chamber. With confidence and control in the safety from an active fluidics system, Dr. Fong said surgeons are able to use higher flow rates and higher vacuum, resulting in faster cases. Dr. Fong said his settings are usually 50–60 mm Hg, but for more complicated cases or when you're just switching to the system, settings are usually higher. "It is not a 'race' to lower IOP settings," Dr. Fong said, emphasizing the importance of customizing settings to the case and the surgeon experience and comfort level.



Vilavun Puangsricharern, MD

To the point of operating at a physiological IOP, **Abhijeet Desai, MD**, Mumbai, India, gave an analogy in a video-based presentation, comparing it to conducting a surgery while the patient's heart is beating vs. on a heart-lung machine. "The more physiological you are, the better you are at postop recuperation," he said.

Dr. Desai began his "journey toward normal IOP surgery" last year, switching from the INFINITI system to Centurion. He started with his initial IOP settings at 55 mm Hg. Currently, he sets his present cases to 26 mm Hg, but he has also been trying cases at 20 mm Hg, something he hopes to transition more consistently to within the next year, thinking that it will be even more possible when Alcon releases Active Sentry. In about 5% of cases, Dr. Desai said he has to increase IOP to as high as 36 mm Hg.

Jiang Yaqin, MD, Shandong, China, began using Centurion in 2014 and has found she is impressed with its high efficiency, especially with dense cataracts, and

improved fluidics, which she said has resulted in less energy use for most of her cases. It's in eyes with short axial lengths where she finds explicit benefit with the technology. Dr. Jiang said she's able to better control and stabilize the whole procedure with customized parameters for patients.

Another opportunity for optimization at the point of phacoemulsification is at the phaco tip and sleeve itself, as seen with the INTREPID BALANCED tip and INTREPID sleeves. While the internal diameter of the tip shaft is comparable to other phaco tips, the outer diameter of the BALANCED tip was decreased, resulting in 10% less weight, said **Myoung Joon Kim, MD**, Seoul, South Korea. Dr. Kim conducted a study on fixed cubes of porcine lenses that were phacoed in a calibration chamber with either a Kelman tip or the BALANCED tip. The Kelman tip took about 43 seconds to remove the cube compared to 12 seconds with the BALANCED tip.

In another experiment, Dr. Kim measured heat gen-



Myoung Joon Kim, MD

eration between the two tips with and without the sleeve removed, finding there was more heat generated with the BALANCED tip without the sleeve compared to the Kelman tip, but less heat with the BALANCED tip with the sleeve. BALANCED tip sleeves have internal "rib-like" structures that Dr. Kim said minimizes stress, providing better stability of aspiration fluid and reduced heat generation.

Dr. Kim also pointed out that the BALANCED tip, unlike older phaco tips, is balanced along the axis of the tip, minimizing movement along the incision site.

Lee Mun Wai, MD, Ipoh, Malaysia, and **Vilavun Puangsricharern, MD**, Bangkok, Thailand, described how systems like the Verion Image Guided System and ORA can aid in outcome optimization. Dr. Lee has been using the Verion for a few years and found it "tightens things up." An imaging component of the system measures anatomical points and is linked to software that allows the surgeon to plan where to place incisions. It also includes different calculations, but it's

the intraoperative guide that Dr. Lee said holds the most value in his practice. This guide can be seen on a stand-alone monitor and through a microscope attachment, he explained, showing where planned incisions should go, providing a capsulorhexis template, and helping align toric IOLs. During phaco, it can show the amount of vacuum, fluidics, and IOP.

All of these features become helpful, Dr. Lee said, in toric cases, especially those with low amounts of astigmatism; in multifocal cases, making sure the lens is centered according to Purkinje images; in white cataract cases for keeping the capsulorhexis on target; and for intrascleral haptic fixation when you need to know where to enter the eye 180 degrees apart. Postoperatively, Dr. Lee described Verion's surgically induced astigmatism analysis and calculation of the mean absolute error.

"It is for the pursuit of happiness," Dr. Lee said of Verion, "because we are looking for happy patients, and

Treating low astigmatism: Is it worth the game?



Chee Soon Phaik, MD, moderating the session



Lee Mun Wai, MD



Jony Chang, MD

Reviewing published literature, the global prevalence of astigmatism is as high as 40.4%, said **Benjamin Cabrera, MD**, Manila, Philippines. The literature also shows that after cataract surgery, there is a large percentage of patients with at least 1 D of residual astigmatism. Another study found that toric IOLs provided better uncorrected distance visual acuity in low astigmatism situations (1 D) compared to patients who had limbal relaxing incisions, Dr. Cabrera said. More

specifically, two to five more letters could be read correctly in the toric group compared to the non-toric group, and 70.3% of toric patients didn't require spectacles for distance compared to 40.8% in the non-toric group, Dr. Cabrera said.

"There are a lot of quality of life and economic burdens that toric IOLs are able to help with," Dr. Cabrera said, noting published research that shows a gain in uncorrected visual acuity and less time spent on healthcare appointments, and thus more productivity.

Correcting low amounts of astigmatism is not only good for the patient but it can be good for business as well, Dr. Cabrera noted, saying that being more comfortable with toric IOLs can be a gateway for ophthalmologists into the market of premium, presbyopia-correcting IOLs as well, helping them become a "true refractive cataract surgeon."

There are challenges with correcting low amounts of astigmatism with toric IOLs, however, but Dr. Cabrera said improvements in diagnostics,

IOL power calculations, pre-operative and intraoperative marking, and surgical quality and precision can help the surgeon overcome his or her own fears and anxieties. The surgeon, Dr. Cabrera said, needs to believe in the technology, the procedure, that evidence supports it, and that it's in the best interest of the patients.

Jony Chang, MD, Taipei, Taiwan, provided pearls that can give ophthalmologists confidence in treating cases of low astigmatism. More than half of Dr. Chang's

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this will allow us to be happy ourselves."

Dr. Puangsrichareern, in addition to discussing how Verion can be used preoperatively and intraoperatively, shared what she considers are the benefits of ORA with VeriEye. "It gives you real-time data of aberrations of the eyes while operating," she said.

Within 2 seconds of properly centering the patient's eye with the system, ORA captures 40 images in order to calculate power, alignment, and other elements based on the aberrations it sees. Dr. Puangsrichareern said she uses ORA twice per case in an aphakic state to make sure there is consis-

tency among measurements, confirming the lens that's going into the eye. She also takes an ORA measurement after lens implantation.

Dr. Puangsrichareern said she uses ORA in cases of post-refractive surgery, high myopia, eyes with differing axial lengths, and with multifocal IOLs. While some

might worry about a shorter working distance with the ORA microscope attachment, Dr. Puangsrichareern finds the working distance to be adequate and added that she uses a "sterile over" to ensure there is no contamination. In terms of operating time, she said ORA has only added 3–5 minutes to her cases.

Challenging case management with advanced technologies



Tchah Hungwon, MD, as moderator

Challenging cases can be made easier with advanced technologies, and **Guo Haike, MD**, Shanghai, China, described

how cataract surgery with the Centurion Vision System on highly myopic eyes is one such example.

Cases of high myopia are more likely to see chamber depth fluctuations, reverse

pupillary block, and patient discomfort, he said. They have a higher incidence of intraoperative complications such as posterior capsule tear, anterior capsule tear, and zonular dehiscence. As such, “it’s all about control in the phaco,” Dr. Guo said, adding that new technology, like that made available through the Centurion Vision System, reduces fluctuation, resulting in a more stable anterior chamber with a controlled and monitored IOP, in addition to a customized build of irrigation pressure.

The Fluidics Management System (FMS) of Centurion is able to detect the pressure of the environment in the eye and deliver that message to the machine with appropriate machine response, if necessary, Dr. Guo explained. Centurion’s Active Fluidics technology, he continued, allows the surgeon to “set and maintain the appropriate IOP” so he or she can “focus more on the patient and

less on managing the phaco system.”

Jun Hun Lee, MD, Seoul, South Korea, expounded on the idea of complicated case management with advanced technologies, including not only the benefits of the Centurion Vision System, but that of Verion and LenSx, the full “cataract refractive suite,” as he called it. He pointed out that he does not have experience with ORA, as it is not yet available in South Korea.

“I call it computer-aided cataract surgery, and you can expect a lot of clinical benefits with this system,” Dr. Lee said.

Dr. Lee showed several personal examples of complex cataract cases and how these technologies can benefit the surgical process and the patient. These included a case of anterior capsular fibrosis, high myopia with an ICL, intumescent cataract, posterior polar cataract, low

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patients (63.9% to be precise) receive a toric IOL. Most often it’s an AcrySof IQ ReSTOR. More than 50% of these cases receive T2 IOLs, and less than 0.5% of his cases receive IOL realignment within 8 weeks postop, he said. How did his practice achieve these numbers? With the right tools, the right surgical techniques, more chair time, and a focus on patient education, Dr. Chang said.

For example, in 2014, he started using the Centurion Vision System for

phacoemulsification and ORA for intraoperative toric alignment. Postoperatively, Dr. Chang focuses on improving his outcomes in the long run by looking for outcome outliers and learning from them. When there is a less than desired outcome with a toric IOL, Dr. Chang said he uses astigmatismfix.com to help decide a course of action (rotation or IOL exchange) and cautioned delegates against YAGing toric cases until they’re sure that poste-

rior capsule opacification is the issue.

Lee Mun Wai, MD, Ipoh, Malaysia, said the Barrett Toric Calculator, which is incorporated into the Alcon Online Toric Calculator, allows ophthalmologists to expand their use of toric IOLs to even lower powers. He also discussed rotational stability of IOLs, describing a case series of his own where he found AcrySof ReSTOR lenses outperformed two other toric options; 90.5% of the AcrySof

ReSTOR cases had less than 5 degrees of rotational stability.

During discussion with **Chee Soon Phaik, MD**, Singapore, Prof. Chee emphasized the importance of getting good biometry for good data that can then provide for the best calculations and the most accurate outcomes. She also said that the problem with low astigmatism and toric implants is that they might not go low enough.

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Li Jin, MD



Junhun Lee, MD



Guo Haike, MD

endothelial cell density or Fuchs' endothelial dystrophy, and high astigmatism. He also showed how the technology made for safer surgery in a case of zonular dialysis after blunt trauma.

"It is very difficult to make the [manual] capsulorhexis because there is no counterforce," he said, showing the benefit of the femtosecond laser for capsulorhexis creation in these cases. He added that the Active Fluidics of the Centurion system make phaco gentle enough to avoid stressing zonules further.

What's more, fragmentation with the LenSx laser makes it possible, in some cases, to perform "zero phaco cataract surgery," Dr. Lee said. Dr. Lee noted that he prefers the grid fragmentation pattern. In denser cataracts, he said the advanced technologies necessitate only minimal ultrasound energy.

Hungwon Tchah, MD, Seoul, South Korea, who moderated the session, addressed parameters when using a femtosecond laser to create the capsulorhexis in intumescent cataract cases. He said, for example, that he increases the power (and decreases the time) to prevent milking, which could result in an incomplete CCC. Dr. Guo said he increases the depth a little bit and noted that the most important step for this procedure in intumescent cataracts is the docking. Dr. Lee pointed out the importance of making sure that the CCC is continuous when created with a femtosecond laser; if it's not, forceps can be used to make the capsulorhexis a little bigger than the femto-created CCC, he explained.

In another challenging case example, **Li Jin, MD**, Wenzhou, China, described a case of an 81-year-old who complained of blurred vision for 30 years and had glaucoma surgery 3 decades prior. Her angle was open 180 degrees, and she had controlled diabetes. The patient had poor mydriasis, visible fibrosis on the pupil margin, posterior iris synechia, and an anterior chamber depth of 1.63 mm. Here Dr. Li was dealing with a dense nucleus, shallow chamber, and small pupil. She has found that Centurion with Active Fluidics decreases incidence of cystoid macular edema, and results in less optic nerve damage and less chance of posterior capsule rupture. The INTREPID BALANCED tip, she added, reduces phaco power and time and results in less incision injury, less optic nerve damage, and less post-op inflammation. In this case, she used an AcrySof IQ IOL, which reduces blue light, results in better contrast sensitivity, less cellular response, and thus good biocompatibility. Its thin, square edge, Dr. Li added, reduces incidence of PCO, it has a high refractive index, and it is easy to implant.

In two other cases—one of ocular trauma, dense cataract, iridodialysis, and another of Fuchs'—Dr. Li described how these technologies and use of the femtosecond laser resulted in easier and safer surgery.

"Your night will become like noonday if you use the advanced technologies in your challenging cases," Dr. Li said.

Taking the leap with topography-guided LASIK



Tae-Young Chung, MD



Paul McCartney, MD



Chen Yueguo, MD



Ik Hee Ryu, MD

Topography-guided LASIK with the Contoura Vision system—the first topography-guided LASIK procedure approved by the U.S. Food and Drug Administration (FDA), which is performed with information from the WaveLight Topolyzer Vario diagnostic device and either the WaveLight Allegretto Wave Eye-Q or WaveLight EX500 Excimer Laser system—offers the opportunity to customize refractive treatments based on the patient's unique cornea.

"For conventional LASIK, we all know it induces higher order aberrations (HOAs), which result in glare, halos, starburst, and reduced contrast sensitivity. There have been numerous efforts to overcome the side effects," said **Tae-Young Chung, MD, PhD**, Seoul, South Korea,

mentioning wavefront-guided, wavefront-optimized, and topography-guided technologies. "We all know wavefront-guided has challenges because the wavefront is dynamic and changing according to ablation. However, the topography-guided ablation aims to target the aberration at the anterior surface of the cornea, which is relatively constant, regardless of accommodation."

Dr. Chung, discussing patient selection for topography-guided LASIK, said the best candidates are those with asymmetric corneal astigmatism, irregular corneal astigmatism, those with a different axis of corneal astigmatism (center vs. periphery), and/or those with a different amount of corneal astigmatism (center vs. periphery). He also said it is well suited for patients with large pupils

or those who are frequent nighttime drivers.

Dr. Chung said the results from the FDA's clinical trial for topography-guided LASIK are "outstanding." Just over 34% of patients achieved 20/12.5 in this trial, 64.8% were able to see 20/16, and 92.6% were 20/20. Patient satisfaction was 98.4%.

"I have never seen any results as good as this," Dr. Chung said.

However, Dr. Chung explained that these results could be because the FDA trial was conducted in patients who had only a small difference between their manifest refraction astigmatism and their measured corneal topography astigmatism. In what he called a "real-world" study of 120 eyes of 60 patients in South Korea, Dr. Chung said one eye was treated according to the FDA protocol, while

the other eye received a wavefront-optimized treatment. In this study, there was no difference in terms of vision or refractive outcomes or in surgically induced ocular HOAs, but corneal aberrations were significantly less in the topography-guided group.

Dr. Chung also addressed the effect of corneal higher order aberrations on refractive astigmatism. He defined refractive astigmatism as including both corneal astigmatism and corneal HOAs. A new protocol, topography-modified refraction (TMR), was developed to treat this. One study of 100 eyes that compared the standard topography-guided protocol to TMR showed that more eyes in the TMR group were able to reach 20/16 and showed refractive stability.

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A guideline put forth by Alcon, Dr. Chung said, suggests that if you have a patient with greater than 1.25 D of difference in astigmatism between the measured and the refractive astigmatism or if the axis varies by more than the current rules (if less than 1.75 D cylinder, the axis should be within 10 degrees; if more than 2 D cylinder, the axis should be within 5 degrees), then the surgeon should decide on the treatment based on his or her comfort level, perhaps considering a wavefront-optimized treatment. If the manifest cylinder is smaller than the measured cylinder, you would follow the modified TMR, the midpoint between the manifest and measured cylinder. If the manifest cylinder is larger than the measured cylinder, then treat the full measured cylinder.

Paul McCartney, MD, Hobart, Tasmania, said Contoura Vision Topography-Guided LASIK is his treatment of choice for myopic patients seeking laser vision correction, provided there are no contraindications.

The most important factors for success with this treatment are obtaining good quality topography data that is reproducible and makes sense with the refraction.

"If good quality topography cannot be obtained or those things don't add up, wavefront-optimized or Custom Q are proven treatment modalities you can fall back on," Dr. McCartney said, adding that he reserves Contoura for first-time myopic treatments, not for hyperopic treatments or retreatments.

Every patient who comes to Dr. McCartney seeking LASIK will have images taken with the Vario, Dr. McCartney said, explaining that he's then able to determine whether the patient would be a candidate for Contoura before even broaching the subject with them.

"I don't promise them something and then find that I don't have data to make that happen," he said, adding that eight to 10 usable images should be obtained.

The best images are obtained in a brightly lit room, which makes it easier for iris registration in surgery, with the eyes wide open, eyebrows lifted, and the chin well forward. Image quality evaluation is built into the Vario software, and Dr. McCartney said technicians should be taught how to check for quality.

He also advised that patients be told to close their eyes between measurements, blinking three times after reopening them to regularize the tear film and to allow the pupil to come down in size. The image should be captured within 3–4 seconds to avoid tear film breakup; if not taken within this timeframe, the patient should be instructed to blink again. If artificial tears are used, Dr. McCartney said they should be non-viscous and preservative free with 5 minutes elapsing after their application before images are taken.

In terms of treatment planning, Dr. McCartney said the Q value should not be adjusted unless it's outside the range of –1 to 0. There is a measured refraction—that

estimated by the machine based on best-fit sphere—and modified refraction, which Dr. McCartney said is the correction you're actually going to use in the topography-guided treatment. The modified can be zeroed out to allow the surgeon to see the higher order aberrations (HOA) you can treat. Dr. McCartney said this is a useful map to look at, keeping in mind that your HOA treatment may modify your sphere and the surgeon might need to adapt to that.

A good way to check is to compare your topography-guided treatment to a wavefront-optimized plan. Dr. McCartney said one should look at the central ablations in the Contoura plan to make sure it is not inducing an unwanted effect in the cornea. If ablation depths are under 7–8 μm , Dr. McCartney said he is happy to proceed. However, if they are getting up to 10 μm , he questions whether the topography-guided treatment would have an unwanted effect.

"Ask yourself, are the topography measurements adequate? ... Do the topographic astigmatism and the refractive astigmatism match? If yes, then move forward with Contoura. If no, then move forward with wavefront-optimized or Custom Q," he said.

The surgery itself is straightforward and not different from other protocols, though light levels in the operating room might need to be adjusted to match the preop photo levels, Dr. McCartney said. He also noted that topography-guided treatment

will align to the topography of the cornea, so axis selection is not required.

Chen Yueguo, MD, PhD, Beijing, China, hailed what he considers the many benefits of Contoura. Standard, symmetrical ablations can leave virgin eyes with asymmetry postop, he said, while topography-guided laser ablation, which provides an asymmetric treatment based on the patient's own topography, reshapes and smooths the corneal surface. Contoura technology also matches the pupil size, adjusts the ablation center in the horizontal and vertical directions, and compensates for cyclotorsion, centering treatment as close to the visual axis as possible.

The role of the surgeon for adoption of topography-guided LASIK, **Ik Hee Ryu, MD**, Seoul, South Korea, said is in managing staff education, office flow, and quality procedures. First, Dr. Ryu explained, the surgeon has to be convinced of the strength of treatment with Contoura and educate staff about the procedure appropriately. Staff should be trained in proper use and analysis of the Topolyzer Vario. It's especially important, Dr. Ryu said, that images be taken with a small pupil, good iris registration, with no shadows from the lashes or nose. The K readings between images should be constant and within 0.5 D of each other. It's also important for the surgeon to personally check the quality of these images prior to going into surgery, he said.

"That's the key for success of the Contoura surgery," Dr. Ryu said.

Treatment strategies and clinical outcomes in refractive surgery



Chen Yueguo, MD, moderating the Refractive session



Zhang Fengju, MD

Presbyopia correction, astigmatism optimization, managing flap complications—there are a whole host of ways and means to improve the various types of refractive surgery.

Zhang Fengju, MD, Beijing, China, provided pearls for Q-adjusted ablation for presbyopia correction. A hyperprolate-shaped cornea, when the Q equals -1 inducing a negative spherical aberration, is the basis for monovision for presbyopia correction, Dr. Zhang said.

Dr. Zhang's first pearl was to adhere to strict indica-

tions for this procedure. The patient should have a regular cornea, pupil size, and good contrast sensitivity. Monovision should be simulated with glasses or contact lenses at near, intermediate, and distance vision. The patient should have reproducible corneal topography, adequate corneal thickness, and should be counseled preoperatively.

Tolerance testing, Dr. Zhang continued, is important. It should be determined whether the patient will function well with a loss of stereopsis and some contrast sensitivity. The Q in the non-dominant eye, Dr. Zhang said, should be -0.6 ~ -1

($Q=0.6$) and the add, according to the patient's requirements and functional age, should be $+0.75$ ~ $+1.5$ D.

Customizing the aspherical aberration profile, using Custom Q software, was another pearl. Dr. Zhang said the preop asphericity is balanced by the asphericity of the lens, anterior chamber depth, lens thickness, and eye length. Achieving asphericity is highly dependent on the refraction being corrected, she said. Q-adjusted monovision ablations should be reserved for lower spherical aberrations, Dr. Zhang continued, putting that at -6 D~ $+1$ D with low cylinder and a regular cornea.

In terms of patient expectations, Dr. Zhang said doctors should set expectations low and prepare the patient for the possible need for enhancement.

The topography-guided Contoura Vision system has made it possible to perform Q-adjusted monovision on patients with irregular corneas, due to its ability to regularize the cornea beforehand. This, Dr. Zhang said, expands the indication for the patients beyond just those with already regular corneas.

"Successful presbyopia management should have good visual acuity for all distances. There is no loss of contrast sensitivity. There is no loss of stereo acuity," Dr. Zhang said. "This requires simulating and counseling before surgery."

Shifting gears to astigmatic correction, Bai Ji, MD, Chongqing, China, discussed the benefit of using the

femtosecond laser for arcuate keratotomy (AK). There are various ways to correct astigmatism—LASIK, PRK, toric implantable collamer lenses (ICLs) or IOLs, and AK, both manual and femtosecond laser-created. LASIK and PRK, Dr. Bai noted, reduce corneal thickness, and a toric ICL might not be an option for the patient due to a shallow anterior chamber or the potential for change in axis. Corneal incisions, he said, change the corneal curvature itself.

So, why use a femtosecond laser for AKs over a manual blade? Femtosecond laser incisions, he said, are more accurate in terms of shape, length, and depth. What's more, Dr. Bai said that they can be individualized based on the patient's own topography.

In a series of patients from his group (five patients, 10 eyes) with myopic astigmatism ranging from -1.5 to -5 D, the WaveLight FS200 with topography was used to create AKs. Treatment went according to expectations in all cases, Dr. Bai said.

"Corneal topography-guided femtosecond laser astigmatism is safe for the correction of myopic astigmatism and has certain validity and predictability," Dr. Bai said.

Management of flap complications with the FS200 were presented by Pierce Lin Pi-Jung, MD, PhD, Taipei, Taiwan. Dr. Lin pointed to a study and mentioned personal experience that

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has found the FS200 to have “the fewest intraoperative complications,” compared to other systems, he said. When flap complications do occur, Dr. Lin continued, they are often caused by suction loss, opaque bubble layer, anterior chamber bubbles, and vertical gas breakthrough. There can also be difficulty when lifting the flap, flap decentration, and microwrinkling.

Dr. Lin offered specific management and prevention techniques for each of these scenarios.

“I think, first of all, correct and standard procedures is the best way to prevent complications,” he said, adding that this includes using excellent equipment, ensuring good patient posture, making sure the corneal conditions are not too wet or too dry and devoid of any foreign bodies, and making sure centration is accurate, that there is good appplanation of the cone and cornea when docking, and that flap settings are accurate.

Suction loss can occur when a patient squeezes their

eyes. Dr. Lin suggested applying an anesthetic drop, using a speculum with a screw, and coaching the patient to keep both eyes open and to relax. If suction loss occurs early, the suction ring can be repositioned and the procedure restarted. If it happens during flap creation, Dr. Lin said the flap can usually be redone at the same depth or perhaps at a deeper plane (40–50 μm deeper).

Another possible source of flap complications, anterior chamber bubbles, can happen if the femtosecond laser dissections are too close to the limbus. They’re more common in small corneas. To prevent this issue, Dr. Lin said flaps should not be placed too close to the limbus and a smaller flap size should be used on small corneas. If these bubbles do occur, Dr. Lin said the light should be turned off to allow the patient’s pupils to dilate, and the patient should sit up until the bubbles disappear or become smaller so the laser can adequately track the pupil margin.

Another complication, flap microwrinkling, can occur if the flap is made too thin (less than 90 μm). If this happens, Dr. Lin said the situation merits careful positioning and use of a scleral contact lens after treatment. Prevention includes making a flap of sufficient thickness (more than 100 μm).

Complications with ICLs are relatively rare, said **Sanjay Chaudhary, MD**, Delhi, India. After reviewing data of the ICLs he has implanted over the years, he found the biggest complaints among these patients are of glare and halos, which he noted occurred in about 16% of cases.

The patient, however, usually adapts to these visual disturbances after 3–6 months, Dr. Chaudhary said, so what the doctor has to do is buy time. He shows the patient a model eye and explains how the ICL is causing these symptoms. He also offers the patient the analogy of walking several kilometers barefoot and developing blisters. If a person were to walk several kilometers

barefoot each day for a long period of time, however, their feet would eventually adapt to this lifestyle and not develop blisters. Patients will similarly adapt to the ICL without long-term visual disturbances, Dr. Chaudhary said.

Residual refractive error from toric ICL rotation, which Dr. Chaudhary said happened in two of his 2,000 ICL cases, was best corrected by exchanging the lens for one size larger to maintain positioning. Redialing the same lens into position does not work. In contrast, patients who have increased IOP post-ICL, which he also noted is rare, should have their ICL replaced with one sized smaller. Finally, there are cases where a patient begins to develop a cataract post-ICL. This rare complication, he said, should be managed by wait and watch protocol, and intervene when it truly reaches a stage where it disturbs vision.



Sanjay Chaudhary, MD



Bai Ji, MD



Pierce Lin Pi-Jung, MD



Giljoong Yoon, MD