

Alcon FORESIGHT 2019

TECHNOLOGICAL ADVANCES IN CATARACT SURGERY

Continuous innovations in surgical techniques and enhancement in technologies has enabled the ophthalmic community to provide better surgical outcomes and more options for cataract patients. The Alcon's FORESIGHT 2019 meeting, which was held on June 22- 23, 2019 in Hong Kong, attracted experts and key opinion leaders from the Asia-Pacific region who showcased the recent advances in techniques and technologies, and shared clinical experience and insight on the latest developments in cataract surgery. The major areas of discussion and interest included advanced technology intraocular lenses, innovative phacoemulsification techniques, cataract refractive suites and three-dimensional cataract surgery. The meeting inspired ideas and discussions with the vision to help patients see brilliantly.

INNOVATION AND EVOLUTION IN CATARACT SURGERY: PAST, PRESENT AND FUTURE

Technological innovation and technique evolution in ophthalmology over the past 20 years, has led to a remarkable transformation in the techniques and success of cataract surgeries, highlighted Dr Ronald Yeoh, Adjunct Associate Professor, Singapore National Eye Centre. Cataract surgery has evolved from couching, intra-capsular cataract emulsification (ICCE), extra-capsular cataract emulsification (ECCE) and small-incision cataract surgery (SICS), to phacoemulsification (phaco) cataract surgery and more recently, to femtosecond laser-assisted cataract surgery (FLACS).

The introduction of foldable intraocular lenses (IOLs) in phaco cataract surgery led to smaller incisions and better refractive results. Further advances in IOL development include asphericity, toricity, bi-focality, tri-focality and adjustable IOLs, providing the patients and surgeons with more options and better outcomes. Newer research on non-diffractive IOLs along with accommodating, adjustable and modular IOLs seems promising in our quest for total spectacle freedom.

"Merely inventing a new technology is not enough; it has to be accompanied by modification of surgical techniques. We need convergence of technology and technique."
Dr. Ronald Yeoh

Further exciting developments in cataract surgery include the cataract refractive suites and three-dimensional (3D) surgery. The new NGENUITY® 3D Visualization System provides real-time data on one screen, while allowing three-dimensional visualization, thereby enhancing surgical performance. The cataract refractive suite also presents a new standard of performance in cataract surgery that integrates different technologies and devices to improve safety, efficacy and precision of cataract surgery.

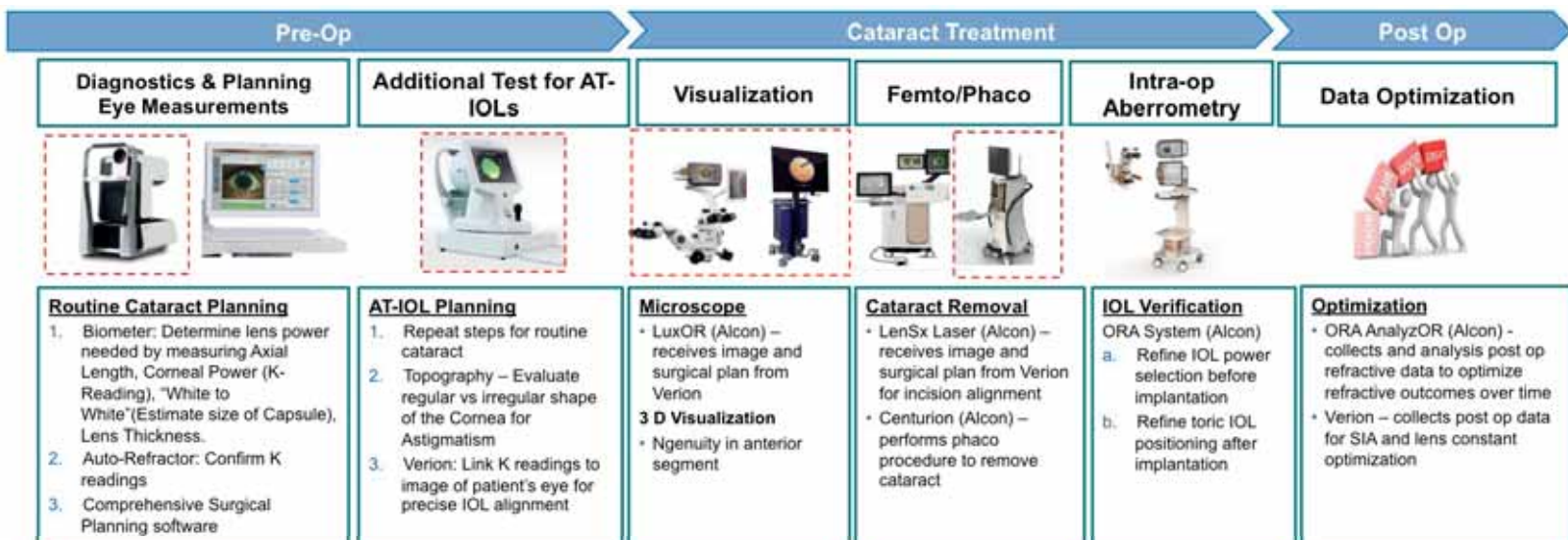
"With surge in development of robots, artificial intelligence and machine learning, the use of healthcare data and speed of implementation of new technologies is changing exponentially."
Mr. Lucien Engelen

"With surge in development of robots, artificial intelligence and machine learning, the use of healthcare data and speed of implementation of new technologies is changing exponentially. The healthcare community will need to catch up with these technologies to stay abreast with the future of healthcare," remarked Mr Lucien Engelen, Global Strategist Digital Health for Deloitte's Center for the Edge, Netherlands.

"Alcon is designing applications to assist patient's journey by simplifying the complexity of surgery and adding efficiency to practice. Seamless data exchange and cloud-based decision support through artificial intelligence and machine learning will address the technology gaps in cataract patients' refractive journey", highlighted Luxin Wang, Alcon Asia Surgical Franchise Head.

"Alcon is designing applications to assist patient's journey by simplifying the complexity of surgery and adding efficiency to practice."
Luxin Wang

Alcon is committed to design applications and address technological gaps in the cataract refractive patient journey



Fully connected and optimized END to END procedure from the clinic to the OR



Ronald Yeoh
Eye & Retina Surgeons
Singapore



Lucien Angelen
Global Strategist
Digital health for Deloitte's
Center for the Edge
The Netherlands



Michael Lawless
Vision Eye Institute
Australia



Cheong Fook Meng
Gleneagles Kuala Lumpur
Malaysia



David Lubeck
Arbor Eye Care
USA



Abhay Vasavada
Raghudeep Eye Hospital
India

ADVANCED TECHNOLOGY IOLs

Advanced-technology IOLs including aspheric IOLs, toric IOLs, multifocal IOLs and accommodative IOLs have transformed cataract surgery into refractive surgery providing enhanced visual performance and optimizing refractive outcomes. The aspheric IOLs counteract the natural spherical aberration present in the human eye, while toric IOLs offer rotational stability and refractive predictability. As opposed to monofocal IOLs that provide one point of focus and result in either a good near vision or distance vision, advanced technology multifocal IOLs provide two or more points of focus and improve both near and distance vision promoting spectacle independence. Since intermediate vision is most important for performing daily tasks on computers and smartphones, trifocal IOLs that improve intermediate vision along with near and far vision play an important role in enhancing patient satisfaction.

AcrySof® PanOptix® and PanOptix® Toric IOLs

Michael Lawless

AcrySof® IQ PanOptix® is a trifocal IOL designed to provide an enhanced visual performance with complete range of vision for near, intermediate, and far distances after cataract surgery, thus reducing spectacle dependence. AcrySof® IQ PanOptix® toric presbyopia and astigmatism-correcting IOL is intended for use in cataract surgery patients with pre-existing corneal astigmatism and allows cataract treatment and astigmatism correction in a single procedure. AcrySof® PanOptix® trifocal IOLs have been shown to provide better visual outcomes at near and intermediate distance vision compared to ZEISS AT LISA® tri 839MP IOL at 6 months post-operatively.¹ AcrySof® PanOptix® trifocal IOLs have also demonstrated significant improvement in near, intermediate and distance visual acuity 12-months after cataract surgery.²

A Japanese study that evaluated the effect of manifest refraction spherical equivalent error on visual acuity in eyes that received a trifocal IOL showed that slight myopia significantly improved near visual acuity but worsened distance visual acuity, whereas slight hyperopia worsened both distance and near visual acuity. Therefore, though emmetropia is the optimum target, slight myopia is a better target refraction than slight hyperopia in patients receiving trifocal IOLs.³

Comparison of Pan-Optix® (panfocal) and AT LISA® (trifocal) IOL after femtosecond laser-assisted lens surgery showed that both Pan-

"Since refractive target near plano with trifocal IOL is the optimal target, my benchmark is 9 out of 10 people should be on target within 0.5D of sphere and cylinder for enhancement rate and YAG capsulotomy rates to be reduced."

Dr. Michael Lawless

Optix and At LISA® IOLs provided excellent distance, intermediate, and near vision, high spectacle independence and high patient satisfaction. However, PanOptix® was better for patients with intermediate vision requirements at 60 cm compared to trifocal At LISA® IOL at 80 cm.⁴

In order to derive the best possible benefit, identification of patients who are ideal candidates for trifocal IOLs is crucial. Though post-operative vision is not affected by angle kappa (κ), the quality of vision will be degraded with a trifocal lens if $\kappa > 0.5\text{mm}$, and there will be more glares and halos if $\kappa > 0.4\text{mm}$. Therefore, it is essential to assess the choice of trifocal IOLs in patients with larger angle kappa.⁵

"I am cautious regarding trifocal IOLs in patients with a preoperative corneal coma > 0.3 or total corneal higher order aberration (HOA) > 0.5 . (for a corneal diameter of 6mm) Some mechanism of looking in greater depth at the quality of visually relevant topography in the central 4 mm zone will help to decide patient suitability for trifocal IOLs" added Dr. Lawless

Pan-Optix® toric IOLs provide enhanced visual performance and optimized refractive outcomes with complete range of vision from near to intermediate to far distance promoting spectacle independence.

SCIENCE AND TECHNOLOGY OF CLAREON® AND CLAREON® AUTONOME®

Beginning with the AcrySof® platform foundation, which was the first material used for IOLs, technological evolution and innovation has led to improvements in design, material and optics of IOLs. Clareon® is a next generation advanced monofocal IOL made from hydroxyethyl methacrylate (HEMA), a hydrophobic acrylic, that helps the IOL to control its water content and offer unsurpassed optical clarity. Clareon® AutoNoMe® is the first and only automated, disposable and preloaded IOL delivery system with comfortable ergonomic hand positions, speed control and full IOL visibility during delivery.

Clareon® - a new standard for IOL clarity

Larry Li

Clareon® features an advanced IOL design and provides unsurpassed clarity of a truly pristine premium IOL thus setting a new standard for IOL clarity. Clareon® constitutes a precision edge design that minimizes glare and dysphotopsia.⁶ The precision design of Clareon® is a result of the new cryo-milling process, which incorporates a proprietary curvature on the side to minimize edge glare and posterior capsular opacification (PCO), explained Dr. Larry Li, Head of RMA, Alcon, Asia-Pacific.

From a biomechanical perspective, Clareon® incorporates STABLEFORCE® haptics to maintain optical stability during compression and allows rapid and controlled unfolding of the IOL due to lower glass transition temperature and with the help of AutonoMe® delivery system.⁶ (Figure 1)

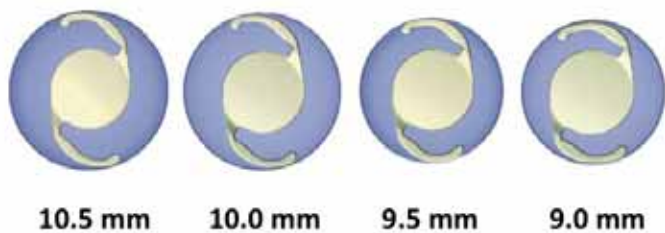


Figure 1: Clareon® STABLEFORCE® haptics maintain optical stability when compressed to 9 mm

A study that compared Clareon® with single-piece AcrySof® IOL, enVista®, TECNIS®, and Vivinex® revealed that Clareon® and AcrySof® show significantly lower axial displacement than others.⁷ Clareon® also demonstrates minimal glare response compared to leading competitors and provides unsurpassed clarity with lowest level of surface haze, subsurface nanoglistenings (SSNGs), and glistenings than other premium monofocal IOLs.

Clareon® is a next generation advanced design monofocal IOL made from hydrophobic acrylic, which provides unsurpassed optical clarity of a truly pristine premium IOL offering lowest level of surface haze, subsurface nanoglistenings, and glistenings, compared to other premium monofocal IOLs.

Clinical experience with Clareon® AutonoMe®

Fook Meng Cheong

Clareon® AutonoMe® is the first and only automated, disposable and preloaded IOL delivery system, driven by an innovative CO₂-powered delivery mechanism.⁸ It is easy and intuitive and allows single-handed injection with a responsive speed control lever and comfortable ergonomic hand positions.^{9,10} It protects incisions with its proprietary depth guard and provides full IOL visibility during delivery with a 3 mm nozzle tip length. (Figure 2)

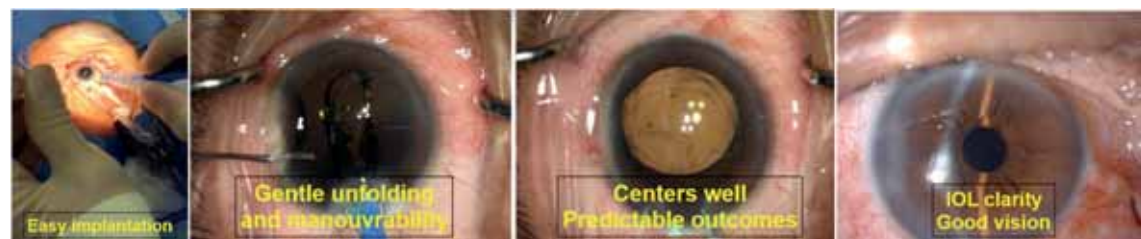


Figure 2: Advantages of Clareon® AutonoMe® Delivery System

The Clareon® AutonoMe® delivery system is prepared in three simple steps with well-defined end-points. The first step involves filling the chamber with ophthalmic viscosurgical devices (OVD) to the tip of the nozzle to ensure a fixed column of OVD in every case, the second step consists of removing the lock-out assembly and the third step involves pressing down fully on the lever to advance the IOL to its pre-delivery position. The automated IOL delivery is then initiated and controlled by the surgeon with the speed control lever.

"With well-defined end-points in the preparatory stage and the automated advancement of the plunger, the volume of OVD and speed of plunger advancement are standardized in every case. Having the same volume of OVD and the same speed of plunger advancement contributes to consistent folded configurations of the IOLs", explained Dr. Fook Meng Cheong.

Dr. Cheong presented an observational audit of his initial experience with the Clareon® AutonoMe® delivery system comprising of

pooled data from 3 sites involving 36 eyes of 33 patients and followed for 1 month. There was minimal corneal incision wound stretch for 2.2 mm incisions; no wound stretch for 2.4 mm incisions and nozzle tip integrity was maintained in all cases without post-operative injector tip damage. With regards to unaided distance visual acuities, all eyes could see 20/40 or better, and 64% of ideal eyes for non-toric IOLs (based on the Barrett Toric calculator) could see 20/20 and 100% could see 20/25 or better. In assessing refractive predictability at 1-month follow-up, 95.6% of eyes were within 0.50D of predicted refraction. In eyes that the Barrett Toric calculator recommended a non-toric IOL implant, 100% of eyes were within 0.50D of predicted refraction.

"In my experience, the feedback received from surgeons was extremely satisfactory regarding the simplicity of preparation, ease of implantation, responsiveness and intuitiveness of using the Clareon® AutonoMe® delivery system," added Dr. Cheong.

Clareon® AutonoMe® is an easy and intuitive automated preloaded IOL delivery system that allows single-handed IOL injection with responsive speed control lever and comfortable ergonomic hand positions.



Abhijeet Desai
Soham Eye Care Centre
India



Vilavun Puangrichareon
Chulalongkorn University
Hospital
Thailand



Zhao Ping
Shenyang AIER Eye Hospital
China



Krishna Prasad
MM Joshi Eye Institute
India



Zhang Chun
Xiamen Eye Center
Xiamen University
China

ROLE OF FLUID DYNAMICS IN CATARACT SURGERY

Intraoperative fluid dynamics influence the intraocular pressure (IOP) fluctuations and therefore the postoperative outcomes in cataract surgery. A prolonged increase in IOP is associated with anterior segment inflammation and IOP fluctuations during cataract surgery increase the risk of posterior capsular rent, a potentially sight-threatening intraoperative complication. Constant measurement and maintenance of IOP during cataract surgery is therefore crucial. Recent improvements in the science and technology of fluid dynamics have opened new avenues for cataract surgeons allowing them to customize fluidics settings with wider range of target IOPs while maintaining chamber stability.

Active Sentry® Handpiece Technology and Intrepid® Hybrid Tip

David Lubeck

Posterior capsular rupture (PCR) is associated with physical, economic and emotional consequences such as prolonged surgery, increased inflammation, need for additional surgery and decreased visual outcomes. PCR can occur during phacoemulsification, irrigation and aspiration, posterior capsule polishing, most commonly due to inadvertent contact between phaco tip and capsule, explained Dr. David Lubeck, an ophthalmic expert from Arbor EyeCare, USA.

The combined Intrepid Hybrid tip and Active Sentry™ technology provides significant advantages during cataract surgery (Table 1), explained Dr. Lubeck.

Table 1: Advantages of Combined Hybrid tip and Active Sentry® technology

1. Allows phacoemulsification closer to the capsule
2. Allows higher aspiration flow rate and vacuum
3. Facilitates surgery at physiologic IOP
4. Simplifies surgery in high risk and unstable eyes (myopia, pars plana vitrectomy or trabeculectomy, traumatic cataract)
5. Decreases likelihood of damage to iris in intraoperative floppy iris syndrome (IFIS) and small pupil eyes

"A technology that uses a safer phaco tip and provides superior chamber stability with less surges will be highly beneficial in reducing the risk of PCR. That's where the Active Sentry® handpiece technology and Intrepid® Hybrid Tip comes in to play."

Dr. David Lubeck

Active Sentry® is the first and only hand piece with a built in intraocular pressure sensor that directly measures intraoperative IOP in real-time and communicates with enhanced Active Fluidics to actuate immediate adjustments to maintain anterior chamber stability.¹¹ The Intrepid® hybrid balance tip is a polymer over-moulded titanium tip with no sharp metal edges, which reduces the likelihood of capsular tear. One lab study showed that 55% phaco power was required to rupture a capsule with a hybrid tip compared to only 15% with a metal tip.¹²

The Intrepid® Hybrid tip and Active Sentry® technology allows the surgeon to have real-time control in the handpiece to facilitate surgery at preferred or physiologic IOP, maintain chamber stability and reduce the risk of capsular tears thus improving patient safety and satisfaction during cataract surgery.

Active Sentry® and dynamic real-time IOP measurements in rabbit eyes

Abhay Vasavada

Dr. Abhay Vasavada, an eye expert from the Raghudeep Eye Hospital in India presented the anecdotal results of his study using dynamic real-time IOP measurements in 30 rabbit eyes comparing phacoemulsification with two types of fluidic systems, the Active fluidics™, which offers IOP control through pressure sensors in irrigation and aspiration line; versus Active Sentry® Handpiece, which features a built-in pressure sensor that reacts in real time. It communicates with the hardware and software to compensate for changes in the anterior chamber, remarked Dr. Vasavada.

smaller IOP fluctuations, with narrower slope to recovery from drop of IOP. The IOP during fragment removal and rate of drop of IOP following occlusion break response was lower in the Active Sentry® group. (Figure 3) The rate of recovery of IOP following occlusion break response was also faster with Active Sentry®.

"A technology that allows the surgeon to preset lower IOPs and mitigate intraoperative IOP fluctuations is advantageous during cataract surgery."

Dr. Abhay Vasavada

The study aimed to record real-time, dynamic IOP during nucleus removal using two types of active fluidic systems; and also compare the time taken to recover to baseline IOP following occlusion break surge in both systems. Standard surgical technique with standardized IOP and vacuum setting was used in both groups. While Active fluidics™ was associated with larger IOP fluctuations with wider slope to recovery from drop of IOP, Active Sentry® was associated with

Group	Mean (+ SD) IOP (mmHg)	% Reduction from Maximum IOP (Mean)
Group I – Centurion Vision System	53.6 ± 7.2	35
Group II – Active Sentry® with Centurion Vision System	51.7 ± 6.6	31
P Value	0.05	0.03

Figure 3: Lower IOP and lower rate of drop of IOP following occlusion break response with Active Sentry®

* Kruskal Wallis Test used

Active Sentry® provides the surgeon with control at fingertips to lower absolute IOP and facilitate better mitigation of occlusion break surge during cataract surgery.

ENHANCING SURGICAL PERFORMANCE WITH CATARACT REFRACTIVE SUITE

Newer technologies and machines provide more data, are user friendly and offer consistency, predictability and accuracy during cataract surgery. However, no single machine is perfect and machines from different productions do not always communicate with each other. To fulfill this gap, we have the next evolution in cataract surgery, the cataract refractive suite, a platform that integrates different technologies and devices to improve safety, efficacy and precision of cataract surgery. Leading ophthalmic experts presented their clinical insights on cataract refractive suite and its components; the Centurion® Vision system, LenSx® laser and ORA® VerifEye+



The Cataract Refractive Suite
BY ALCON

Centurion® Cataract Refractive Suite

Abhijeet Desai

The Centurion® cataract refractive suite includes the VERION™ Image Guided System, LenSx® laser, LuxORLX3 operating microscope, Centurion® vision system, range of advanced technology IOLs and ORA® VerifEye+. The VERION™ image guided system assists in pre-operative planning of choice of IOL, incision and axis and lens position. The innovative phacoemulsification by the Centurion® vision system provides greater chamber stability, lower temperature rise and improved surgical control.

The Active Fluidics™ allows dynamic IOP management by monitoring the aspiration flow rate, irrigation pressure and vacuum, and compensates for pressure loss to maintain the target surgeon-selected IOP. Surgeons can select a target IOP ranging from higher to near normal physiologic IOP according to their preference and skill level. Since Active Fluidics™ mitigates IOP surge effectively it allows the surgery to be performed at physiologic IOP, thus maintaining anterior chamber stability.

Furthermore, the Ultrasert™ delivery system allows consistent, predictable and controlled IOL insertion, and the Optiwave Refractive Analysis (ORA™) system with VerifEye+ technology performs intraoperative aberrometry that provides unique information to improve refractive outcomes. With the amalgamation of several

technologies the cataract refractive suite offers several advantages. (Table 2)

Table 2: Advantages of Cataract Refractive Suite

1. Increases accuracy and predictability
2. Integrates diagnostics
3. Improves work flow and patient movement
4. Saves time, which converts in to better quality counseling
5. Avoids of transcription errors
6. Increase consistency of results
7. Offers efficient post-operative analysis
8. Improves physician conviction on advice on premium IOLs

Cataract Refractive Suite is a new standard of performance in cataract surgery, which features an amalgamation of several technologies and devices that improve safety, efficacy and precision of cataract surgery and promote predictable post-operative outcomes.

Getting the Best Out of the Centurion® Vision System

David Lubeck

The Centurion® Vision System features innovative phacoemulsification technologies that offers greater chamber stability, lower temperature rise and improved surgical control during cataract surgery. The Centurion® Vision System incorporates multiple intelligent technologies to improve surgical precision and efficiency of cataract surgery.

"I want everyone to think of cataract surgery with Centurion® Vision System as a process of integrated functions working in coordination. We must broaden our thought matrix to understand how the capabilities of Centurion® Vision System can facilitate more efficient and safer cataract surgery", said Dr. David Lubeck.

Centurion® Vision System sets a new standard of performance in cataract surgery by combining multiple intelligent phaco technologies and offers greater chamber stability, lower temperature rise and improved surgical control during cataract surgery.

Table 3: Unique features of Centurion® Vision System

1. Active fluidics™
 - Allows the surgeon to work at more efficient flow and vacuum rates
 - Optimizes anterior chamber stability
 - Allows surgery at physiologic IOP
2. Balanced tip probe improves phaco efficiency
 - Reduces power requirement
 - Reduces heat at incision
 - Reduces impact on endothelium and other intraocular structures
3. Continuous torsional ultrasound for phacoemulsification provides
 - Better nucleus followability
 - Decreased nucleus chatter
 - Fewer loose nucleus fragments
 - Efficient nucleus emulsification.
4. Ergonomic design, wireless footswitch and intuitive touch-screen display
5. Applied Integration™ allowing use easier combination with other technologies

Achieving Target Refractive outcomes with ORA® VerifEye+

Vilavun Puangsricharern

The Optiwave Refractive Analysis (ORA™) system with VerifEye+ technology is an intraoperative aberrometry that provides unique information to improve refractive outcomes. It allows true measurement of complete refractive error by including the effect of posterior corneal curvature and surgically induced astigmatism for each eye. It provides IOL sphere, cylinder and alignment suggestions. ORA™ also indicates the residual refractive after IOL insertion and allows refinement of toric IOL axial placement before leaving the operating room, highlighted Dr. Vilavun Puangsricharern.

A study that compared ORA™ system wavefront aberrometers with surgeon best preoperative choice, the Haigis L, and the Shammas IOL formulas in eyes undergoing cataract surgery after prior myopic LASIK, showed that that IOL power was most effectively predicted by ORA™ system. (67% in ORA™ group had mean absolute error within 0.5 D vs. 46% in conventional method group). The mean absolute error was 0.35D in ORA™ vs. 0.6D in conventional method.¹³ Another

study compared the accuracy of ORA™ versus pre-operative biometry in predicting residual refractive error after cataract surgery in axial myopia. SRK/T, Holladay 1, AL-optimized Holladay 1, Holladay 2, Barrett Universal II, and Hill-RBF formulas were used for pre-operative prediction of residual refractive error. The study showed that ORA™ was as effective as AL-optimized Holladay1 formula, and better than all other formulas based on preoperative biometry in predicting residual refractive error and reducing hyperopic outcomes.¹⁴

ORA™ system with VerifEye+ technology facilitates intraoperative measurement and analysis of the refractive power of the eye and provides assurance through empowered decisions, which help surgeons to improve refractive outcomes and avoid refractive surprises.

Bringing Precision to a higher level with LenSx®

Zhao Ping

Though femtosecond laser assisted cataract surgery (FLACS) results in less deviation from target refraction, faster visual recovery, earlier stabilization of refraction and lower incidence of higher order aberrations, recent research has shown that femtosecond laser-created clear corneal incisions (CCIs) during cataract surgery were associated with more surgically induced astigmatism (SIA) than manually created CCIs.¹⁵⁻¹⁷ The SIA during femtosecond laser-created CCIs is believed to be due inaccurate or uncertain corneal incision positioning of the femtosecond machine.¹⁸

This is where LenSx® femtosecond laser platform comes in to action, as it is designed to increase the safety and efficiency of cataract surgery by offering enhanced automation, precise and customizable incision architecture and precise capsulotomies. One of the unique features of LenSx® is the curved contact lens patient interface (PI) as opposed to noncontact liquid optical interface in other laser platforms.¹⁸ LenSx® allows the surgeon to choose the position and architecture of the corneal incisions, centration, diameter of the anterior capsulotomy and depth and type of fragmentation pattern.¹⁸ Furthermore, incisions with LenSx® are more consistent and closer to the target incision geometry, explained Prof. Zhao Ping. He also provided several practical tips on creating successful CCIs with femtosecond laser. (Table 4)

LenSx® femtosecond laser features enhanced capabilities with multi-curvature patient interface and offers superior precision with clean and customizable incisions enhancing the safety and efficiency of cataract surgery.

Table 4: Tips to make successful CCIs

1. Adjust the illumination to get better recognition of limbus
2. Understand the influence of side cut angle
3. Avoid decentered suction during docking
4. Use sharp instrument to open the incision
5. In case of incomplete incision, use keratome to finish the incision
6. Protect the incision and avoid distortion to minimize SIA

A recent LenSx® software update offers enhanced incision visualization and easier incision placement. Future software update with planning for swept source optical coherence tomography (OCT) to allow real-time high definition images and dynamic display of incision is expected to elevate the level of precision in cataract surgery, added Prof. Zhao Ping.



LenSx® Laser
with VERION™ Digital Marker

THE THREE-DIMENSIONAL CATARACT SURGERY

The latest and exciting evolution in cataract surgery is the introduction of the three-dimensional (3D) surgical platform. The NGENUITY® 3D Visualization System consists of a high definition camera that captures real-time images from the operating microscope and displays magnified three-dimensional images on a screen thus providing an immersive visualization experience improving precision, depth, and detail during cataract surgery.

NGenuity® - Better Visualization and Ergonomics in Cataract Surgeries

Krishna Prasad

Dr. Krishna Prasad, a leading expert from MM Joshi Eye Institute in India provided an overview of the NGENUITY® 3D Visualization System and pointed out that compared to traditional analog microscopes, NGENUITY® delivers up to 48% greater magnification, up to 5 times extended depth of field, and up to 42% finer depth resolution.¹⁹ Highlighting the advantages of NGENUITY® (Table 5), Dr. Prasad mentioned that the expanded surgical view provides an excellent educational tool and provides a unique learning experience. Furthermore, the data fusion software enables integration of NGENUITY® with the CONSTELLATION® Vision System, and allows display of intraocular pressure, flow rates, infusion pressure, and laser power in one screen.

“NGENUITY® is an interesting tool for cataract surgery with real-time view of the surgical field and is not difficult to learn.”

Dr. Krishna Prasad

Another unique feature of NGENUITY® is its superior surgical ergonomics, which allows the surgeon to perform a heads-up surgery by displaying the image of the surgical field on a 3D screen. The surgeon does not need to look through the microscope thus minimizing the strain on neck and back. This is a significant advantage since several studies shown that ophthalmologists are highly vulnerable to neck pain, back pain, headaches and musculoskeletal disorders due to the constant strain from looking through the microscope.²⁰⁻²³

Through its high magnification and real time surgical information, NGENUITY® 3D visualization system not only provides enhanced real-time surgical view facilitating improved outcomes, but also offers improved surgical ergonomics to the surgeons.

Table 5: Advantages of NGENUITY®

1. Expanded surgical view
2. Expansive immersive environment
3. Complete real-time view of surgical information
4. Potential for better communication and workflow
5. Promotes improved learning environment
6. Acts as an educational tool
7. Offers superior surgical ergonomics, minimizing the strain on neck and back

Digital 3D Visualization in Various Anterior Segment Surgeries with NGENUITY®

Zhang Chun

Dr. Zhang Chun presented case videos of procedures where he used NGENUITY® in his practice. His cases included phacoemulsification procedure, management of uveitis with anterior synechiae, congenital cataract with fibrosis of anterior capsule, subluxated lens, cataract with persistent hyperplastic primary vitreous and grade 5 cataract.

“I had been using NGENUITY® the last 2 years to perform all my ophthalmic surgeries including anterior segment surgery”, said Dr. Zhang

Dr Zhang reiterated that the NGENUITY® visualization system provides high magnification increased depth of field, wider field of view, lower illumination and data fusion, along with effective learning environment and superior ergonomics, an important tool in any cataract surgery.

NGENUITY® provides enhanced magnification and high-definition three-dimensional visualization of the surgical field during various anterior segment surgeries.

Ngenuity®
Digital Assisted Surgery



KEY TAKE HOME MESSAGES

1. Technological innovation and technique evolution in ophthalmology has led to a remarkable transformation in the techniques and success of cataract surgeries
2. Advanced-technology IOLs including aspheric IOLs, toric IOLs, multifocal IOLs and accommodative IOLs have transformed cataract surgery into refractive surgery providing enhanced visual performance and optimizing refractive outcomes.
3. AcrySof® PanOptix® and PanOptix® Toric IOLs provide enhanced visual performance and optimized refractive outcomes with complete range of vision from near to intermediate to far distance promoting spectacle independence.
4. Clareon® is a next generation advanced design monofocal IOL made from hydrophobic acrylic, which provides unsurpassed optical clarity of a truly pristine premium IOL offering lowest level of surface haze, subsurface nano-glistenings (SSNGs), and glistenings, compared to other premium monofocal IOLs.
5. Clareon® AutonoMe® is an easy and intuitive automated preloaded IOL delivery system that allows single-handed IOL injection with responsive speed control lever and comfortable ergonomic hand positions.
6. The Intrepid® Hybrid tip and Active Sentry® technology allows the surgeon to have real-time control at fingertips with wider range of target IOPs to facilitate surgery at preferred or physiologic IOP, maintain chamber stability and reduce the risk of capsular tears thus improving patient safety and satisfaction during cataract surgery.
7. Cataract Refractive Suite is a new standard of performance in cataract surgery, which features an amalgamation of several technologies and devices that improve safety, efficacy and precision of cataract surgery and promote predictable post-operative outcomes.
8. Centurion® Vision System sets a new standard of performance in cataract surgery by combining multiple intelligent phaco technologies and offers greater chamber stability, lower temperature rise and improved surgical control during cataract surgery.
9. ORA™ system with VerifEye+ technology facilitates intraoperative measurement and analysis of the refractive power of the eye and provides assurance through empowered decisions, which help surgeons to improve refractive outcomes and avoid refractive surprises.
10. LenSx® femtosecond laser features enhanced capabilities with multi-curvature patient interface and offers superior precision with clean and customizable incisions enhancing the safety and efficiency of cataract surgery.
11. Through its high magnification and real time surgical information, NGENUITY® 3D visualization system not only provides enhanced real-time surgical view facilitating improved outcomes, but also offers improved surgical ergonomics to the surgeons.
12. Seamless data exchange and cloud-based decision support through artificial intelligence and machine learning is expected to assist patient's journey by simplifying the complexity of surgery and adding efficiency to practice in the near future.

References

¹ Lapid-Gortzak R, Duch F, Elies D, Guarro M, Martinez A. Multicenter Visual Outcomes Comparison of Two Trifocal Presbyopia Correcting IOLs – 6 Months Post-op Results. World Ophthalmology Congress. Barcelona 2018. ² Kohnen T, Martinez A. Multicenter Visual Outcomes Evaluation of a Novel Trifocal Presbyopia Correcting IOL – 12 months post-op results. XXXVI Congress of the ESCRS. Vienna 2018. ³ Hayashi K et al. Effect of Spherical Equivalent Error on Visual Acuity at Various Distances in Eyes With a Trifocal Intraocular Lens. *J Refract Surg.* 2019 May 1;35(5):274-279. ⁴ Böhm M et al. Comparison of a panfocal and trifocal diffractive intraocular lens after femtosecond laser-assisted lens surgery. *J Cataract Refract Surg.* 2018 Dec;44(12):1454-1462. ⁵ Qi Y et al. Role of angle κ in visual quality in patients with a trifocal diffractive intraocular lens. *J Cataract Refract Surg.* 2018 Aug;44(8):949-954. ⁶ Alcon Data on file. ⁷ SS Lane et al. "Evaluation of the mechanical behavior of a new single-piece intraocular lens as compared to commercially available IOLs". Presentation at the European Society of Cataract and Refractive Surgeons (ESCRS) annual meeting; October 7–11, 2017; Lisbon, Portugal. ⁸ Clareon w AutonoMe Preloaded_CNA0T0_gSLT_1016_final - v2. ⁹ Clareon AutonoMe Direction for Use. ¹⁰ Alcon Data on file. ¹¹ Nicoli CM, Dimalanta R, Miller K. Experimental anterior chamber maintenance in active versus passive phacoemulsification fluidics systems. *J Cataract Refract Surg.* 2016;42(1):157-162. ¹² Shumway, Caleb et al. Evaluation of the Capsular Safety of a Novel Hybrid Phacoemulsification Tip in a Cadaver Eye Model. *Journal of Cataract & Refractive Surgery*, (article in press) <https://doi.org/10.1016/j.jcrs.2019.06.016> ¹³ Ianchulev T et al. Intraoperative refractive biometry for predicting intraocular lens power calculation after prior myopic refractive surgery. *Ophthalmology.* 2014 Jan;121(1):56-60. ¹⁴ Hill DC et al. Intraoperative aberrometry versus preoperative biometry for intraocular lens power selection in axial myopia. *J Cataract Refract Surg.* 2017 Apr;43(4):505-510. ¹⁵ Conrad-Hengerer I et al. Comparison of visual recovery and refractive stability between femtosecond laser-assisted cataract surgery and standard phacoemulsification: six-month follow-up. *J Cataract Refract Surg.* 2015 Jul;41(7):1356-64. ¹⁶ Ernest P et al. Higher Order Aberrations in Femtosecond Laser-Assisted Versus Manual Cataract Surgery: A Retrospective Cohort Study. *Journal of Refractive Surgery.* 2019;35(2):102-108. ¹⁷ Zhu S et al. Morphologic features and surgically induced astigmatism of femtosecond laser versus manual clear corneal incisions. *J Cataract Refract Surg.* 2017 Nov;43(11):1430-1435. ¹⁸ Roberts TV et al. Update and clinical utility of the LenSx femtosecond laser in cataract surgery. *Clin Ophthalmol.* 2016;10:2021–2029. ¹⁹ Alcon data on file. Yin L, Sarangapani R. Assessment of visual attributes for NGENUITY® 3D Visualization System 1.0 for digitally assisted vitreoretinal surgery. Alcon Modeling and Simulation. December 2017. ²⁰ Chatterjee A et al. Back pain in ophthalmologists. *Eye (Lond)* 1994;8(Pt 4):473-4. ²¹ Dhimitri KC et al. Symptoms of musculoskeletal disorders in ophthalmologists. *Am J Ophthalmol* 2005;139:1:179-81. ²² Chams H et al. Frequency and assortment of self-report occupational complaints among Iranian ophthalmologists: A preliminary survey. *Med Gen Med* 2004;13:6:4:1. ²³ Jonathan N et al. National survey of back & neck pain amongst consultant ophthalmologists in the United Kingdom. *Int Ophthalmol.* 2015 2015 Dec;35(6):769-75.

Disclaimer: The opinions expressed in this symposium highlights are those of the speakers and not necessarily those of Alcon. Any liability or obligation for loss or damage howsoever arising is hereby disclaimed. No part of this publication may be reproduced by any process in any language without the written permission of Alcon.



The Cataract
Refractive Suite
BY ALCON

