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Advanced technologies for improved patient outcomes

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2014 ASCRS Clinical Survey reveals clinical practice trends

With rapidly advancing laser-assisted cataract surgery technology, more than half of members responding to the 2014 ASCRS Clinical Survey stated laser cataract surgery may provide significant benefits compared with conventional surgery in creating arcuate incisions (59.3%) and the capsulorhexis (58.8%) and fragmenting the lens (52.1%) (Figure 1).

Non-U.S. respondents were less likely to take this position regarding various applications versus their U.S. counterparts, with non-U.S. respondents choosing 1.8 benefits of laser cataract surgery versus 2.2 chosen by U.S. respondents. The largest difference between the 2 groups (24.5%) was observed in the arcuate refractive incision option (46.2% of non-U.S. respondents versus 70.7% of U.S. respondents).

More than 1,500 members responded to the second annual survey, which was performed at the 2014 ASCRS•ASOA Symposium & Congress in Boston and through electronic follow-up surveys. This group accounted for a significant portion of the membership. Members were asked 134 questions regarding a range of current topics in ophthalmology. In addition, 17% of respondents were residents, fellows, and ophthalmologists within 5 years of practice and were asked to respond to an additional set of questions.

For those responding, the average annual volume of cataract cases was 490. Toric IOLs were used in 8.4% of cases and presbyopia-correcting IOLs in 7.2% of cases. The average laser vision correction annual volume was 290 cases among respondents.

Of these respondents, 50.2% were from the U.S. and 49.8% were from outside the U.S.

Laser-assisted cataract surgery

Regarding laser-assisted cataract surgery, 62% of respondents had reimbursement or financial concerns and more than 30% lack access to technology. Nearly 30% also reported concerns with patient flow and efficiency, and more than 30% believe data proving clinical benefits is insufficient. More than 50% respondents believe laser-assisted cataract surgery does not improve capsulorhexis creation, lens fragmentation, or arcuate incisions compared with conventional surgery (58.8%, 52.1% and 59.3%, respectively).

Ninety-two percent of respondents expect to use laser-assisted cataract surgery for at least some of their procedures in 10 years.

It is important for clinicians to understand the impact of postoperative inflammation on clinical outcomes and patient satisfaction. Thirty-five percent consider 1+ cell/flare normal 3 to 7 days after cataract surgery. More than 40% reported that their patients use both nonsteroidal anti-inflammatory medications and steroids 1 day after surgery.

In performing cataract surgery, 35.8% of respondents believe they lack a thorough understanding of intravitreal treatments patients may be receiving for age-related macular degeneration or diabetic macular edema, although 39% of respondents perform these injections.

On average, respondents see 470 patients with glaucoma each year, with U.S. respondents seeing more of these patients compared with non-U.S. respondents. They believe 8.6% of their cataract patients are candidates for microinvasive glaucoma surgery (MIGS). Forty-three percent of respondents currently provide or intend to provide this procedure in the next year.

Laser vision correction

Most U.S. respondents reported that wavefront-customized ablations will account for most of their laser vision correction procedures in the next 2–3 years (52.3%), compared with 23.6% of non-U.S. respondents (Figure 2). Conversely, 34.5% of non-U.S. respondents believe wavefront-optimized ablations will make up most of their laser vision procedures during this period (U.S., 29.5%). There was a statistically significant difference between the U.S. and non-U.S. responses.

When asked how they assess successful laser vision correction outcomes, more than 50% of respondents consider the percentage of patients with uncorrected visual acuity (UCVA) of 20/20 or better (63.6%; 71.7% of

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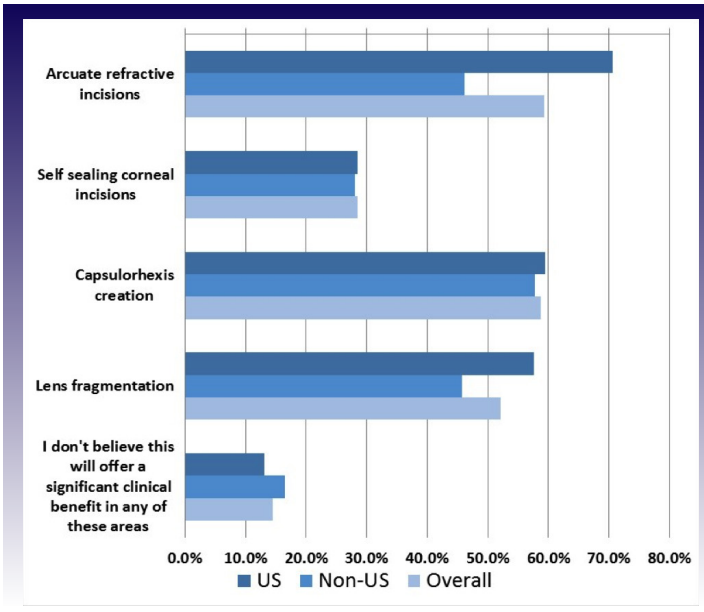

Figure 1. Respondents believe laser cataract surgery is most beneficial when performing arcuate incisions, capsulorhexis, and lens fragmentation.

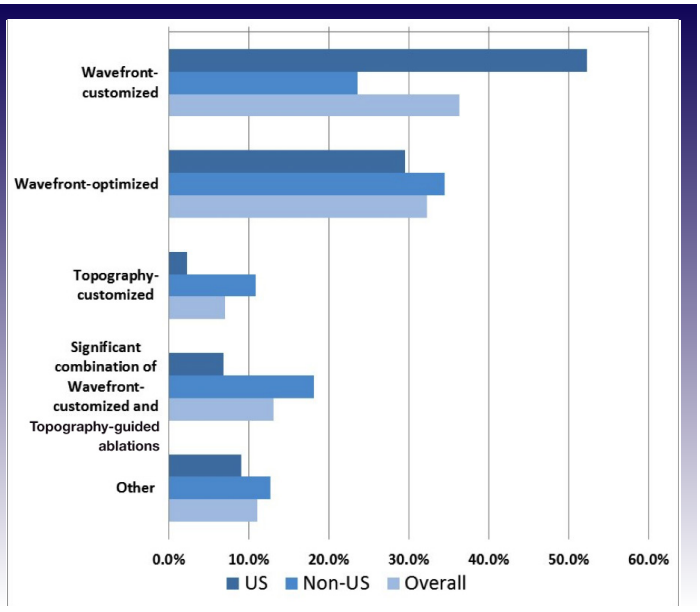

Figure 2. Respondents indicate the ablation category that will account for most of their laser vision correction procedures in the next 2–3 years.

"21.1% [of respondents] have no standardized method to assess a successful outcome after laser vision correction"

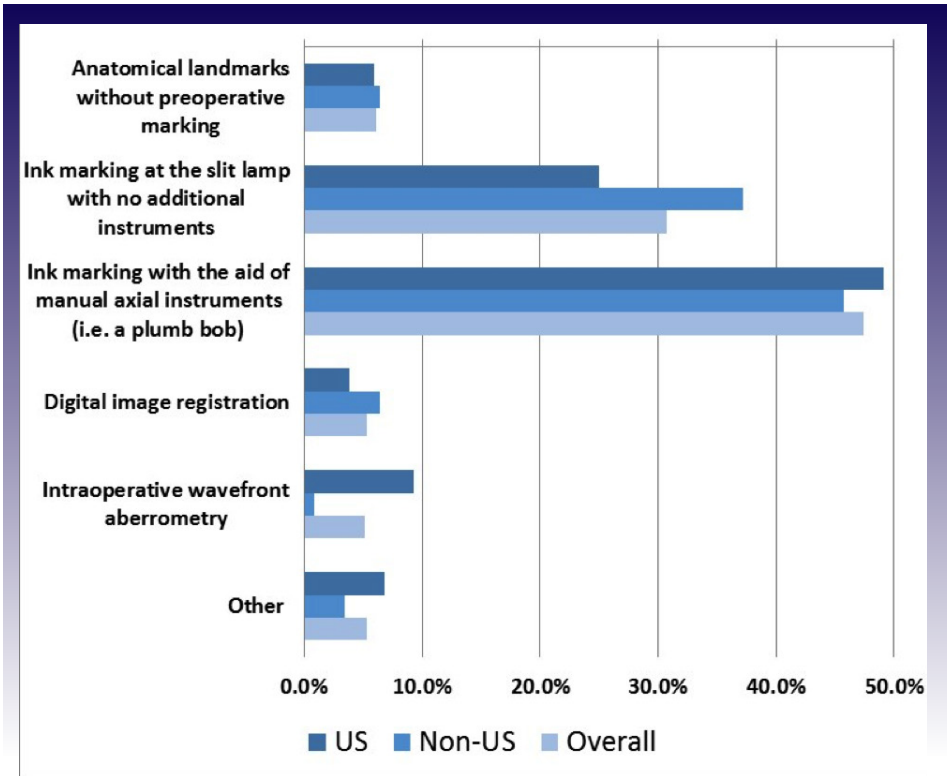

Figure 3. When implanting a toric IOL, surgeons are most likely to use ink marking with the aid of manual axial instruments to align the preoperative axis measured with diagnostic tools with the intraoperative axis.

U.S. respondents versus 57.3% of non-U.S. respondents) and patient satisfaction ratings (51.7%; 52.4% of non-U.S. surgeons versus 50.7% of U.S. surgeons). Less than 20% looked at the percentage of patients with 20/16 or better UCVA (non-U.S., 17.3%; U.S. 12.3%), the ratio of patients with postoperative UCVA/preoperative best corrected visual acuity (non-U.S., 15.7%; U.S., 13.8%), and visual quality contrast sensitivity testing (non-U.S., 16.2%; U.S., 2.2%). In addition, 21.1% have no standardized method to assess a successful outcome after laser vision correction.

Toric IOLs

To achieve optimal outcomes after implantation of toric IOLs, surgeons need to understand the optimal use of diagnostic devices, alignment of axis measured preoperatively and intraoperative intended axis, effect of rotational error, and calculation of surgically induced astigmatism and posterior astigmatism.

When members were asked how they align the preoperative axis assessed with their diagnostic tools with the intraoperative axis when implanting toric IOLs, 47.5% responded that they are ink marking with manual axial instruments (Figure 3). Among respondents, 49.2% of U.S. respondents and 45.7% of non-U.S. respondents used this method. The second preferred method was ink marking at the slit lamp without additional instruments; however, non-U.S. respondents are almost 50% more likely to use this method compared with U.S. surgeons (37.2% versus 25%, respectively). Less than 1% of non-U.S. respondents rely on intraoperative wavefront aberrometry compared with almost 10% of U.S. respondents. There was a statistically significant difference between U.S. and non-U.S. responses.

When respondents implant toric IOLs, topography is the primary preoperative measurement they rely on when making astigmatism axis decisions. Otherwise, results regarding diagnostic tools varied widely.

After toric IOL implantation, 30.2% of surgeons believe 10 degrees or more of rotational error is acceptable before the patient's visual quality and acuity are affected significantly.

Presbyopia-correcting IOLs

Although many surgeons are implanting presbyopia- correcting IOLs, clinicians encounter a number of challenges, particularly given patients' high expectations after surgery.

Average			
	US	Non-US	Overall
Near Vision	7.2	7.6	7.4
Intermediate Vision	6.2	6.0	6.1
Distance Vision	8.3	8.2	8.3

Top 2 Response % (9 or 10)			
	US	Non-US	Overall
Near Vision	24.8%	40.2%	32.4%
Intermediate Vision	14.8%	14.0%	14.3%
Distance Vision	52.3%	53.7%	53.1%

Figure 4. Patient satisfaction 1 year after implantation of a presbyopia-correcting IOL (0 = least satisfied; 10 = most satisfied)

Respondents were asked how satisfied patients are with presbyopia-correcting IOLs at various distances 1 year after surgery (responses: 0 = least satisfied; 10 = most satisfied).

One year after surgery, patients are most satisfied with their distance vision (average score, 8.3) (Figure 4). More than half of respondents (53.1%) believe their patients would provide scores of 9 or 10 for distance vision, with 53.7% of non-U.S. respondents reporting this versus 52.3% of U.S. respondents.

Patients are least satisfied with their intermediate vision after 1 year, according to respondents, with an average score of 6.1. Only 14.3% believed patients would provide scores of 9 or 10 for their intermediate vision 1 year after implantation of a presbyopia-correcting IOL (14.8% of U.S. respondents; 14% of non-U.S. respondents, a difference that was not statistically significant).

Forty-four percent of respondents reported that 0.75 D or more postoperative cylinder does not significantly affect visual quality after implantation of a presbyopia-correcting IOL, but 42% do not correct residual cylinder with laser vision correction. In this instance, 22.3% were most likely to use limbal relaxing incisions/astigmatic keratotomy, 18.4% chose glasses or contact lenses, and 1.4% chose other options. In addition, among patients receiving presbyopic IOLs without residual refractive error and a healthy ocular surface, 40% of responding ASCRS members believe more than 5% have significant dysphotopsia.

Ocular surface

As well as focusing on technologic innovations in refractive surgery, surgeons need to recognize the role of the ocular surface in achieving optimal refractive and cataract outcomes. More than 40% of respondents strongly agree that mild or moderate ocular surface dysfunction affects results, and 62% strongly agree or agree that Schirmer's testing increases the accuracy of their diagnostics. Only 13% believe advanced tear diagnostics should be used. According to respondents, 20% of cataract patients and 19% of laser vision correction patients present with ocular surface dysfunction requiring treatment in addition to artificial tears. However, 35% of respondents were not familiar with the Delphi/DEWS guidelines for treating aqueous deficiency dry eye and meibomian gland dysfunction.

Young ophthalmologists

Among young physicians, 43% had implanted 5 or fewer toric IOLs, 66% had implanted 5 or fewer presbyopia-correcting IOLs, and 63% performed 5 or fewer corneal relaxing incisions to manage astigmatism during their residencies. Most of these respondents believe this experience is inadequate.

In addition, 63.1% of young respondents did not have formal refractive curriculum training during residency, the time when most of these respondents believe it is appropriate to begin this training. During residency, 68.3% of young physicians performed 5 or fewer laser vision correction procedures.

Young ASCRS members surveyed were very interested in receiving more education in advanced cataract and refractive technologies.

"63.1% of young respondents did not have formal refractive curriculum training during residency, the time when most of these respondents believe it is appropriate to begin this training"

Femtosecond laser for bladeless cataract surgery and astigmatism correction

Eric Donnenfeld, MD

"Femtosecond incisions are fully customizable and adjustable. Surgeons may choose the exact location, size, and depth of the incisions"

During the last 5 years, advances in the femtosecond laser for cataract surgery have been extraordinary, offering surgeons new opportunities, according to **Eric Donnenfeld, MD**, speaking at the "Advanced Technologies for Improved Patient Outcomes" symposium at the 2014 Asia-Pacific Association of Cataract & Refractive Surgeons meeting.

Improved corneal incisions

Dr. Donnenfeld, who practices at Ophthalmic Consultants of Long Island and is a clinical professor of ophthalmology at New York University, explained that laser-assisted capsulotomies are more precise, and the femtosecond laser can soften the lens and reduce ultrasound energy during lens fragmentation.

Moreover, the femtosecond laser offers greater control when creating arcuate incisions to correct astigmatism (including intrastromal incisions) and can produce cataract incisions with a three-dimensional architecture, for better reproducibility and sealability. Good clear corneal incisions decrease the risk of endophthalmitis 17-fold, he explained.

In contrast, when manually creating clear corneal incisions, it can be difficult to precisely control incision parameters, regardless of the surgeon's skill level. In addition, although the primary incision must be astigmatically predictable and self-sealing, when using a keratome it is difficult to consistently ensure a reliably self-sealing incision, he said.

The Catalys cOS 3 operating system (Abbott Medical Optics, Abbott Park, Ill.) optimizes corneal incisions. All OCT scans during the incision confirmation refresh at 0.5 to 2 Hz. The integral guidance system detects the clear cornea region and automatically positions the cataract, primary, and sideport incisions within the outermost clear cornea. High-resolution images enhance precise positioning of all incisions, especially arcuate, primary, and sideport incisions.

A major advancement of femtosecond laser technology is the reverse sidecut incision, which is made by cutting back toward the limbus, away from the center of the eye, and then forward into the eye. This creates a self-sealing incision reproducibly without hydration. With this technique, surgeons can reduce the arc length, for a smaller incision, resulting in less induced astigmatism. In addition, it is easier to remove the subincisional cortex.

Treatment of preexisting astigmatism maximizes premium IOL results. To reduce preexisting astigmatism, 25% of surgeons perform limbal relaxing incisions (LRIs) with cataract surgery, according to the 2009 International Society of Refractive Surgery survey. However, manually creating LRIs may result in a variable and unpredictable treatment and response. The depth, length, angulation, and position of the incision are imprecise. Therefore, LRIs have been considered an art form rather than a science.

Femtosecond lasers have transformed the creation of refractive incisions into a science—increasing predictability and reproducibility. Femtosecond incisions are fully customizable and adjustable. Surgeons may choose the exact location, size, and depth of the incisions. However, surgeons must adjust their nomograms when switching from manual to laser arcuate incisions.

The full effect of the incision is not achieved until the surgeon manually opens the incision. The surgeon may titrate the response to the laser by adjusting the line separation, spot separation, energy, and angulation of incision.

To treat lower degrees of cylinder, Dr. Donnenfeld prefers intrastromal ablations for arcuate incisions. Because intrastromal incisions are less effective than full-thickness incisions, a smaller optical zone is needed. Intrastromal incisions do not break through the epithelium, so there is no risk of infection, Dr. Donnenfeld said.[1–3] In addition, patients have less dry eye and no pain, and the incisions do not gape.

Conclusion

Technologic advances offer surgeons new opportunities when using the femtosecond laser for cataract surgery. Computer-controlled arcuate astigmatic incisions are adjustable and titratable, and surgeons can opt for intrastromal incisions. Self-sealing reverse sidecut primary incisions induce less astigmatism and provide easier access to the subincisional cortex.

References

1. Binder PS, Gray B, Brownell M, Martiz J, Gown A, Hill J. Morphology of femtosecond intrastromal arcuate incisions. 2012.03.07-ME48392.
2. Meltendorf C, Burbach GJ, Ohrloff C, Ghebremedhin E, Deller T. Intrastromal keratotomy with femtosecond laser avoids profibrotic TGF-beta1 induction. *Invest Ophthalmol Vis Sci* 2009;50(8):3688–95.
3. Rashid ER, Waring III GO. Complications of radial and transverse keratotomy. *Surv Ophthalmol* 1989; 34:73–106.

Increased add powers offer greater options in presbyopia-correcting surgery

With the evolution of multifocal IOL technology, including a wider array of add powers, clinicians have a greater range of options to customize near, intermediate, and distance vision to the demands of each individual patient's lifestyle, according to **Florian T.A. Kretz, MD, FEBO**, International Vision Correction Research Centre, David J. Apple International Laboratory of Ophthalmic Pathology, and Department of Ophthalmology, University of Heidelberg, Germany, who spoke at the "Advanced Technologies for Improved Patient Outcomes" symposium at the 2014 Asia-Pacific Association of Cataract & Refractive Surgeons meeting.

Definitions of near, intermediate, and distance vision are very customizable, Dr. Kretz explained. For example, near-distance needs may encompass reading (30 cm), texting and using mobile phones (40 to 50 cm), or writing in a notebook (60 to 70 cm). Therefore, surgeons need to individualize patient care and consider how each individual spends his or her time when selecting the correct IOL.

Targeting optimal vision

Rabsilber and colleagues studied 104 eyes of 52 cataract patients (mean age, 65 years; range, 53 to 84 years) who received the Rayner M-flex 630F refractive multifocal IOL (East Sussex, U.K.).[1] In the first group, a +3.0 D near add IOL was used bilaterally, and a +4.0 D near add IOL was used bilaterally in the second group. In the third group, a +3.0 D near add IOL was used in the dominant eye and a +4.0 D near add IOL in the nondominant eye. Although results were favorable for near and distance vision, the study lacked strong intermediate vision data.

Alfonso and colleagues also reported variable intermediate vision with 4 different multifocal IOL models (spherical multifocal with +4.0 D add; aspheric multifocal with +4.0 D add, +3.75 D add, or +3.0 D add).[2]

Dr. Kretz then turned to the Tecnis 1-piece multifocal IOL (Abbott Medical Optics, AMO, Abbott Park, Ill.), which offers a low-add alternative of +2.75 D up to +4.0 D adds, as well as a toric model. According to an AMO internal study of 49 eyes, a key benefit of the Tecnis IOL was that spherical aberration was reduced to essentially zero, maximizing visual quality (Figure 1).

He achieved excellent near and distance visual acuity with different near add powers. Although the uncorrected near vision decreases with a reduction in add power, the uncorrected intermediate vision increases as the add power is reduced, enabling customization based on the patient's specific near vision needs.

Increasing patient satisfaction

Results from the 2014 ASCRS Clinical Survey showed that surgeons believe patients with presbyopia-correcting IOLs are more satisfied with their near and distance vision than their intermediate vision 1 year after surgery. When respondents rated patient satisfaction on a scale of 1 (least satisfied) to 10 (most satisfied), they provided average scores of 7.4 for near vision and 8.3 for distance vision. However, they reported an average score of 6.1 for intermediate vision. Less than 15% of respondents believe their patients would score their satisfaction with intermediate vision as 9 or 10.

With advancements in technology and expanded low-add multifocal IOL options, however, surgeons now have more tools they can use to customize their patients' vision—for greater patient satisfaction.

References

1. Rabsilber TM, Rudalevicius P, Jasinskas V, Holzer MP, Auffarth GU. Influence of +3.00 D and +4.00 D near addition on functional outcomes of a refractive multifocal intraocular lens model. *J Cataract Refract Surg*. 2013;39(3):350–7.
2. Alfonso JF, Fernández-Vega L, Puchades C, Montés-Micó R. Intermediate visual function with different multifocal intraocular lens models. *J Cataract Refract Surg*. 2010;36(5):733–9.

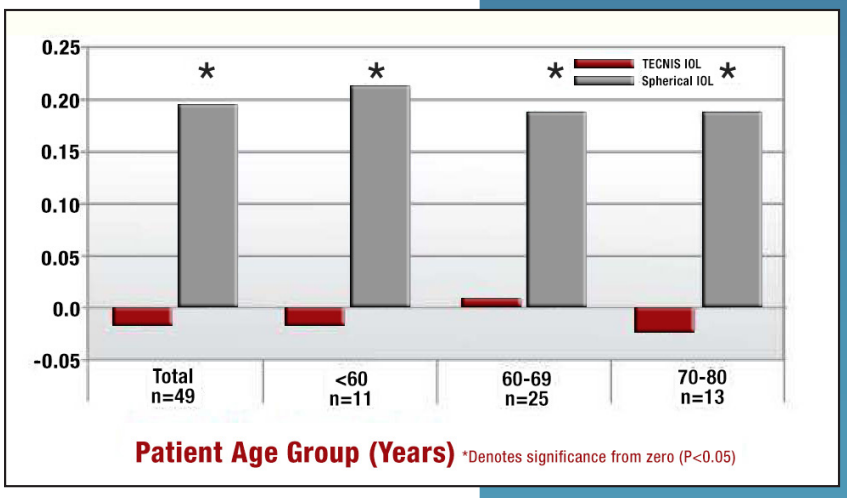

Figure 1. Mean spherical aberration measurements, 90±15 days postop. Spherical aberration was reduced to essentially zero with the Tecnis multifocal IOL.

Florian T.A. Kretz, MD, FEBO

"With advancements in technology and expanded low-add multifocal IOL options, surgeons now have more tools they can use to customize their patients' vision"

High-definition technologies improve visual outcomes

Rohit Shetty, DNB, FRCS

"Achieving optimal outcomes is a science as well as an art, and meticulous preoperative planning is critical"

Surgeons can achieve a new level of refractive visual outcomes by implementing advanced high-definition wavefront diagnostics, according to **Rohit Shetty, DNB, FRCS**, vice chairman, Narayana Nethralaya, Bangalore, India, during the "Advanced Technologies for Improved Patient Outcomes" symposium at the 2014 Asia-Pacific Association of Cataract & Refractive Surgeons meeting.

After refractive procedures, patients often have unrealistic expectations, anticipating improved spectacle-free vision in 100% of cases, without the risk of complications or the need for enhancements. However, the predictability of procedures ranges from 85 to 97%, with a complication rate of 2 to 5%.

In diagnosing a broader range of patients with these technologies and performing wavefront-driven laser vision correction, surgeons may continue to improve visual quality—not just visual quantity—potentially enabling them to achieve greater patient satisfaction when managing more complex refractive disorders as well as their standard cases.

Greater resolution

The iDesign Advanced WaveScan Studio (Abbott Medical Optics, Abbott Park, Ill.) provides a new level of high-resolution definition and incorporates 5 measurements in a single capture sequence, auto-refraction, wavefront aberrometry, corneal topography, keratometry, and pupillometry, and uses a Hartmann-Shack wavefront sensor. Whereas the WaveScan (AMO) captures 240 data points, iDesign includes 1,250 data points, for improved spot quality and better detection of highly aberrated eyes.[1]

Given the increased number of data points, the iDesign's Fourier algorithms more efficiently and reliably convolve shapes more closely aligned with the data points in highly aberrated eyes, for greater precision than Zernike algorithms. This is particularly critical in complex conditions, such as keratoconus, where high-resolution technology is essential.

Preoperative planning

Achieving optimal outcomes is a science as well as an art, and meticulous preoperative planning is critical, Dr. Shetty explained. Ablation plans can have completely different consequences, depending on the platform.

Robust diagnostics and excellent symbiosis between technologies are key. The iDesign system drives ablation with the STAR S4 IR Excimer Laser (AMO).

The most significant measure of a system's effectiveness may be in how it manages difficult cases. In the past, the visual effects of hidden aberrations, optics, poor biomechanical response and healing, and decentration, cyclorotation, and pupil shift have been poorly understood.

For example, Dr. Shetty explained that keratoconus was diagnosed in a 31-year-old man with significant cylinder and visual quality issues. His best corrected visual acuity was 20/20, but he had difficulty driving at night, experiencing glare and halos. Wavefront analysis demonstrated various levels of higher aberration, but Dr. Shetty could develop a treatment plan using the iDesign system.

Although keratoconus cases rarely provide a significant number of valid data points, the iDesign captures much more data. In this case, it acquired almost 100% of Hartmann-Shack data, providing the surgeon with greater confidence in creating the treatment plan.

After treatment of the patient's right eye, defocus, astigmatism, coma, and trefoil were significantly reduced, leading to a solid postoperative uncorrected visual acuity. iDesign ablations can greatly reduce higher order aberrations, significantly improving a patient's visual quality.

Conclusion

According to results from the 2014 ASCRS Clinical Survey, nearly 85% of members who responded do not require uncorrected visual acuity results exceeding 20/20 after laser vision correction or do not have standardized means to assess successful results.

However, by consistently evaluating outcomes, surgeons can target results beyond 20/20 and superior visual quality. Advanced high-definition technology can help them achieve this, which will build patient satisfaction and their practices.

Reference

1. Neal DR, Baer CD, Copland J, et al. Combined wavefront aberrometer and new advanced corneal topographer. ASCRS 2008; MP392.

Optimizing results from toric IOLs in astigmatic patients

Daniel A. Black, MBBS, FRANZCO, FRACS

> *"To maximize outcomes after implantation of a toric IOL, quality materials and attention to detail are crucial"*

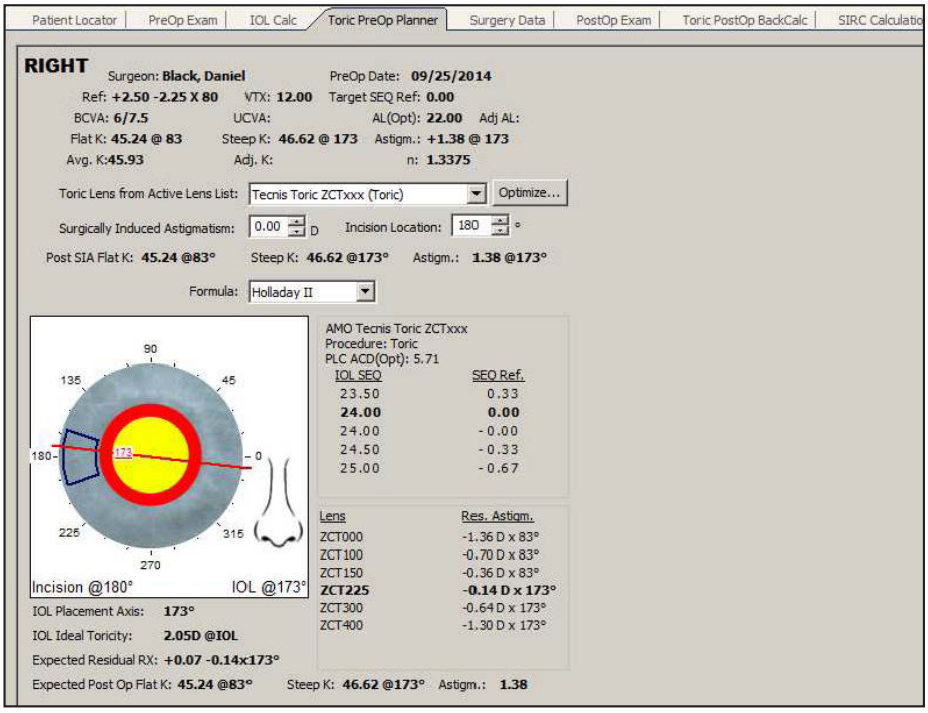

Figure 1. Preoperative planning before implantation of a toric IOL

Forty percent of patients presenting for cataract surgery have significant astigmatism.[1] However, patients expect to live a spectacle-free lifestyle after surgery, reported **Daniel A. Black, MBBS, FRANZCO, FRACS**, senior lecturer, University of Queensland, Australia, during the "Advanced Technologies for Improved Patient Outcomes" symposium at the 2014 Asia-Pacific Association of Cataract & Refractive Surgeons meeting.

To achieve success in these patients, quality material and attention to detail are key, he explained.

Toric IOL benefits

According to Pineda and colleagues, patients benefit economically when their astigmatism is corrected with toric IOLs, which reduces their lifetime expenditures on spectacles and contact lenses.[2] Moreover, other researchers have reported that toric IOLs provide more predictable and stable refraction than manual incisional surgery.[3,4] Manual astigmatic keratotomy may induce spherical aberrations, coma, trefoil, and quadrafoil.[5]

To validate the effectiveness of the toric IOL in correcting astigmatism, Dr. Black conducted a retrospective analysis of 595 cases. The Tecnis Toric (Abbott Medical Optics, Abbott Park, Ill.) was chosen for its high optical quality, with chromatic aberration correction, spherical aberration correction, and a low refractive index and because it permits full light transmission and is free of glistenings.

Surgery was performed by a single surgeon using a single technique, and patients had a minimum of 1-month follow-up. Eyes had corneal astigmatism of 0.6 D or greater, including primary and secondary astigmatism resulting from refractive surgery or corneal scarring.

Biometry was performed on a virgin tear film with the IOLMaster (Carl Zeiss Meditec, Jena, Germany). IOL toric correction was calculated with the Holladay IOL Consultant and data were imported electronically, which eliminated transcription errors (Figure 1). IOLMaster keratometry was used to calculate the astigmatism axis and power. The Holladay calculated toric correction was required. Surgically induced astigmatism was not adjusted

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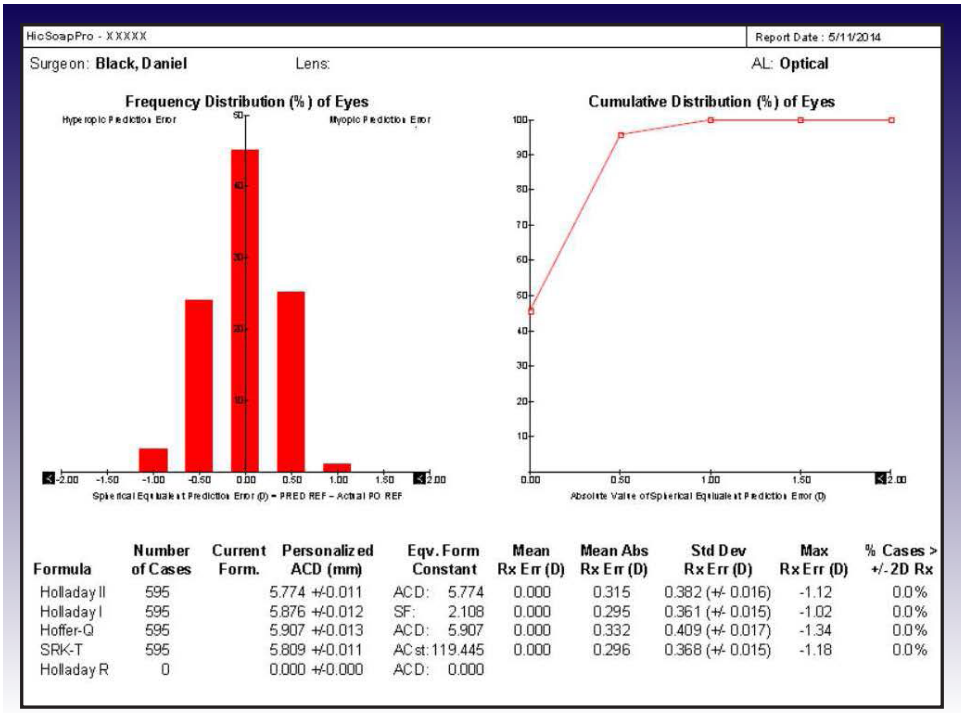

Formula	Number of Cases	Current Form.	Personalized ACD (mm)	Eqv. Form Constant	Mean Rx Err (D)	Mean Abs Rx Err (D)	Std Dev Rx Err (D)	Max Rx Err (D)	% Cases > +/-2D Rx
Holladay II	595		5.774 +/-0.011	ACD: 5.774	0.000	0.315	0.382 (+/- 0.016)	-1.12	0.0%
Holladay I	595		5.876 +/-0.012	SF: 2.108	0.000	0.295	0.361 (+/- 0.015)	-1.02	0.0%
Hoffer-Q	595		5.907 +/-0.013	ACD: 5.907	0.000	0.332	0.409 (+/- 0.017)	-1.34	0.0%
SRK-T	595		5.809 +/-0.011	ACst: 119.445	0.000	0.296	0.368 (+/- 0.015)	-1.18	0.0%
Holladay R	0		0.000 +/-0.000	ACD: 0.000					

Figure 2. Analysis of sphere correction in retrospective analysis of 595 patients receiving Tecnis Toric IOL

during the calculation.

Surgery was performed using a temporal bimanual technique, and phaco chop was performed with the AMO Signature system. The IOL was implanted through a 2.2-mm wound into the capsular bag using the manufacturer's injector and aligned with the marked steep axis. Ophthalmic viscosurgical device was thoroughly removed.

In these cases, a mean absolute refractive error of 0.30 D was achieved (SD, 0.36) (Figure 2); 98% of cases had 0.75 D or less postoperative astigmatism. Of the 595 cases, 0.5% had more than 1 D postop astigmatism.

Two cases had a radial tear in the continuous curvilinear capsulorhexis, and the IOL was implanted in the bag with no problems. Five cases had cystoid macular edema, but each case resolved with a topical steroid and ketorolac. No cases required additional surgery.

Based on various studies, the Tecnis Toric mean postoperative rotation ranges from 2.1 to 3.4 degrees.

Surgical outcomes

The Tecnis Toric provided effective long-term correction of lower order aberrations (sphere and cylinder) and maximized visual quality, correcting chromatic aberration and spherical aberration, with a low refractive index to minimize dysphotopsia and full light transmission.

To maximize outcomes after implantation of a toric IOL, quality materials and attention to detail are crucial, Dr. Black said. He recommended that surgeons perform biometry and IOLMaster measurements first. The tear film must be as undisturbed as possible during these assessments because these instruments measure the curvature of the tear film. He also advised marking the steep axis, ensuring accurate capsulorhexis size and centration, carefully aligning the IOL, and thoroughly removing viscoelastic.

References

1. Ferrer-Blasco T, Montés-Micó R, Peixoto-de-Matos SC, González-Méijome JM, Cerviño A. Prevalence of corneal astigmatism before cataract surgery. *J Cataract Refract Surg* 2009;35(1):70–5.
2. Pineda R, Denevich S, Lee WC, Waycaster C, Pashos CL. Economic evaluation of toric intraocular lens: a short- and long-term decision analytic model. *Arch Ophthalmol* 2010;128(7):834–40.
3. Mingo-Botín D, Muñoz-Negrete FJ, Won Kim HR, Morcillo-Laiz R, Rebolleda G, Oblanca N. Comparison of toric intraocular lenses and peripheral corneal relaxing incisions to treat astigmatism during cataract surgery. *J Cataract Refract Surg* 2010;36(10):1700–8.
4. Hirnschall N, Gangwani V, Crnej A, Koshy J, Maurino V, Findl O. Correction of moderate corneal astigmatism during cataract surgery: toric intraocular lens versus peripheral corneal relaxing incisions. *J Cataract Refract Surg* 2014;40(3):354–61.
5. Navarro R, Palos F, Lanchares E, Calvo B, Cristóbal JA. Lower- and higher-order aberrations predicted by an optomechanical model of arcuate keratotomy for astigmatism. *J Cataract Refract Surg* 2009;35(1):158–65.

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