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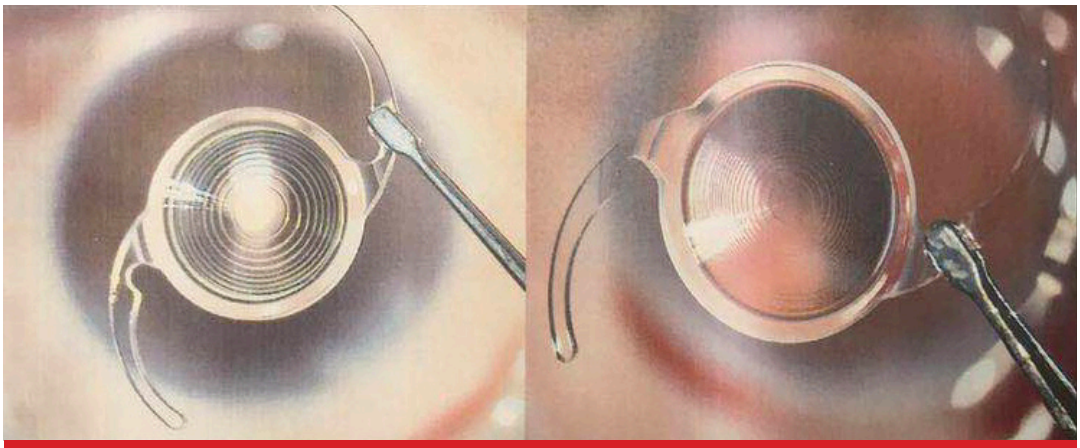
Delivering the next generation of outcomes with new lens and corneal refractive technology

Sponsored by Johnson & Johnson Vision

Yao Ke, MD, Hangzhou, China, and **Ronald Yeoh, MD**, Singapore, led a symposium during the 2017 Asia-Pacific Association of Cataract & Refractive Surgeons (APACRS) meeting in Hangzhou, China on optimizing outcomes with currently available premium lens and corneal refractive technologies. The faculty included **Fam Han Bor, MD**, Singapore, **Edward Manche, MD**, Palo Alto, California, and **He Tian Geng, MD**, Tianjin, China.



Dr. Yao described studies comparing the Symfony IOL and the ZMB00 IOL. A study at his center found that the Symfony lens provided better uncorrected and distance corrected intermediate vision and also had excellent contrast sensitivity.

Source: Yao Ke, MD

Extended range of vision for presbyopia after cataract surgery

Dr. Yao presented on extended depth of focus (EDOF) IOLs for presbyopia after cataract surgery, reviewing the various options available for patients.

In 1958, monovision was introduced. This option offers better intermediate vision compared to standard multifocal IOLs, and there is good contrast sensitivity. Disadvantages, however, include anisometropia, compromised stereopsis, and inconsistent reading ability. In 1987, bifocal IOLs began to be used, which offer optimal distance and near vision, but also have contrast sensitivity loss, light energy loss, and visual interference. Accommodative IOLs have been an option since 2003. These have the advantages of good intermediate vision, less photic phenomena, and good contrast, however, they have a limited accommodation range, difficulty with effective lens position (ELP) assessment, and reduction of accommodation by capsular contraction and fibrosis.

Trifocal IOLs became an option in 2010, and these offer a full range of good vision and high rate of spectacle independence. But Dr. Yao noted that there are three co-existing foci that are perceived by the visual cortex, and there could be more photic phenomena.

Dr. Yao then spoke about the Symfony (Johnson & Johnson Vision, Santa Ana, California), an extended range of vision IOL, which offers extended depth of focus; a continuous range of near, far, and intermediate vision; a bigger central optic area, which can ensure far vision if the IOL is decentered; and fewer diffractive rings for less visual interference. It also offers a pattern of light diffraction that elongates the focus of the eye resulting in about 1.5 D of extended range of vision.

The Symfony has nine diffractive rings of echelette design on the posterior surface, Dr. Yao said, and a 1.7 mm diameter of the center refractive optic.

Dr. Yao described several studies using EDOF lenses. In one study by Pedrotti et al.,[1] the Symfony was compared to the monofocal Tecnis ZCB00 IOL (Johnson & Johnson Vision), with 50 eyes of 25 patients with the Symfony and 15 eyes of 30 patients with the Tecnis. It was determined that the Symfony displayed smooth defocus curves, without loss of distance vision or decrease in optical quality analysis parameters.

Dr. Yao also referenced a study by Hamid et al.[2] that compared the Symfony lens to trifocal options. Conclusions from the study were that the Symfony has advantages in distance and intermediate vision as well as in contrast sensitivity and photic phenomena control. The study found that near vision, defocus curve between –1.5 D to –3.0 D, and spectacle independence were better with the trifocal options.

Dr. Yao discussed a study at his center that was conducted from August 2016 to March 2017 in 27 eyes of 18 patients. Several factors were examined, including visual acuities at different distances, defocus curve, near contrast sensitivity, aberration, modulation transfer function (MTF) graph, and photic phenomena. The study found that the Symfony

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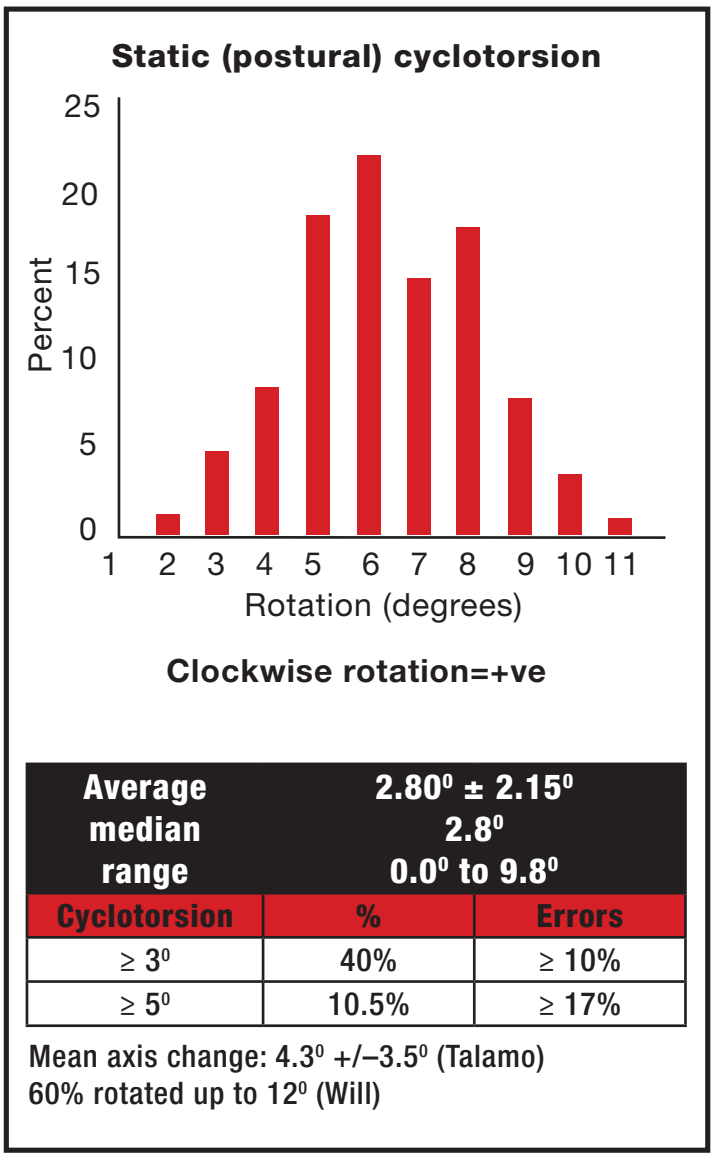
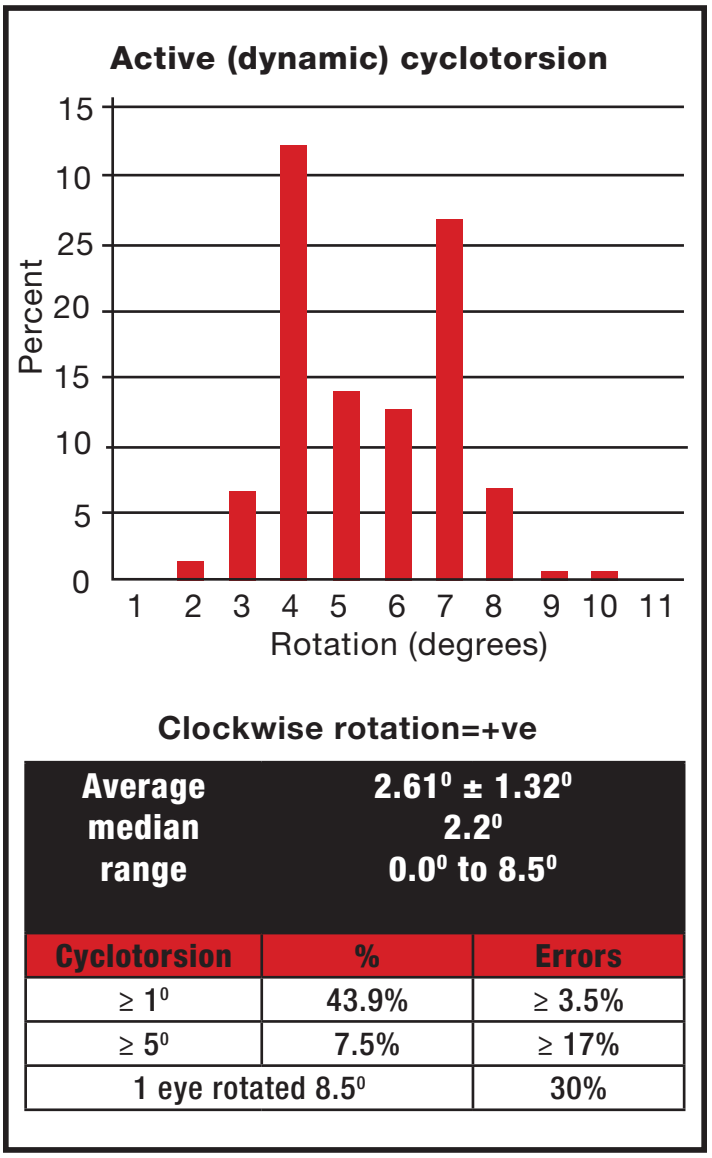


Average median range	2.80⁰ ± 2.15⁰ 2.8⁰ 0.0⁰ to 9.8⁰	
Cyclotorsion	**%**	**Errors**
≥ 3⁰	40%	≥ 10%
≥ 5⁰	10.5%	≥ 17%

Mean axis change: 4.3⁰ +/–3.5⁰ (Talamo)
60% rotated up to 12⁰ (Will)



Average median range	2.61⁰ ± 1.32⁰ 2.2⁰ 0.0⁰ to 8.5⁰	
Cyclotorsion	**%**	**Errors**
≥ 1⁰	43.9%	≥ 3.5%
≥ 5⁰	7.5%	≥ 17%
1 eye rotated 8.5⁰		30%

Dr. Fam discussed the impact of cyclotorsion and the large amount of error that is produced from the slightest degrees of postural or dynamic cyclotorsion.
Source: Fam Han Bor, MD

lens provided better uncorrected and distance corrected intermediate vision than the diffractive bifocal IOL it was compared to (ZMB00). On the defocus curve, the EDOF lens outperformed the ZMB00, particularly in the range from –1 D to –1.5 D. Additionally, Dr. Yao said that under glare or no-glare conditions, EDOF technology had excellent contrast sensitivity through a wide range of frequency compared to the ZMB00. Under the 3 mm and 5 mm pupil range, the total aberration of Symfony was less than that of the ZMB00. No significant differences were observed regarding total high order aberration and coma. The curve of the MTF graph was smoother in EDOF technology than in the ZMB00 under the 3 mm and 5 mm pupil range, indicating a better image quality in the Symfony optic system. Dr. Yao said that EDOF technology tended to cause less photic phenomena than the ZMB00, but its statistical significance needs to be further confirmed.

Astigmatic management with toric IOLs: Patient selection, intraop alignment, and postop management

Dr. Fam presented on astigmatic management with toric IOLs. He emphasized that proper patient selection for a

Dr. Manche said there were excellent clinical outcomes in both groups, as well as excellent predictability. There was no difference in the induction of higher order aberrations between the two groups. However, there was 25% better contrast acuity in the WFG group and greater gains in CDVA in the WFG group as well. Additionally, he noted better UDVA at 20/16 or better in the WFG group.

toric IOL is critical to achieve successful cataract refractive surgery, and stable keratometry readings are key for optimizing visual outcomes. Dr. Fam offered a number of pearls for obtaining key keratometric readings. This starts with the need to maintain a stable cornea before diagnostic readings are taken. He explained there needs to be balance in the tear film and to lubricate the cornea if necessary, but avoid the excessive use of eye drops.

He shared a number of successful toric IOL studies, highlighting the importance of managing spherical aberration, maintaining refractive stability, visual acuity and residual astigmatism, and axis alignment, among other factors.

He offered several tips to achieve optimal results in toric IOLs. With toric IOL selection, he suggested calculating the appropriate sphere power, determining the toric power, and ascertaining the axis. The impact of posterior corneal astigmatism is vital in calculating the correct total astigmatism.

In terms of axis alignment, Dr. Fam stressed reference marking to ensure that the IOL is precisely aligned within the eye relative to the patient's axis of corneal astigmatism. Dr. Fam discussed the impact of cyclotorsion and the large amount of error that is produced from the slightest degrees of dynamic or postural cyclotorsion. He shared different methods for aligning an IOL intraoperatively with the use of manual ink marking and more advanced intraoperative imaging methods.

Dr. Fam concluded with a message on controlling induced astigmatism and that wound-induced astigmatism should stay consistent in terms of incision site, size, and strength of the incision.

Ultimately, choosing the right patient, the right IOL, and the right power are all necessary to achieve optimal results with toric IOLs.

Review of study data comparing safety and efficacy of today's corneal refractive options: Custom LVC, optimized LVC, and SMILE

Dr. Manche's presentation compared wavefront-guided (WFG) and wavefront-optimized (WFO) excimer laser technology. These have become the technologies of choice for excimer laser vision correction surgery, he said, and there are approximately the same number of WFG and WFO LASIK treatments performed annually in the U.S. But the pressing question is, are there any significant differences in outcomes between the two technologies?

Dr. Manche described several studies comparing WFG and WFO LASIK, noting that although both provide excellent outcomes, WFG seemed to yield superior outcomes at higher levels of visual acuity. He mentioned a paper from Moussa et al.[3] comparing CustomVue WFG (Johnson & Johnson Vision) with iDesign to WFO on the MEL 80 excimer laser (Carl Zeiss Meditec, Jena, Germany). Results showed that the WFG had better outcomes at 20/20, 20/16, and 20/12.5 UCVA.

He described a study he participated in at Stanford University that showed excellent clinical outcomes and predictability in both the WFG and WFO groups. The study was a prospective study with 200 eyes of 100 subjects.

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There was faster visual recovery in the WFG LASIK group and better UDVA at 20/16 or better in the WFG LASIK group. Study enrollment is ongoing, Dr. Manche noted.

The study was contralateral, and each eye was randomized to either WFG or WFO. Eyes were randomized by ocular dominance.

WFG LASIK was performed with the CustomVue platform, and WFO LASIK was performed with the Allegretto Wave Eye-Q 400 Hz excimer laser (Alcon, Fort Worth, Texas). All LASIK flaps were created with the IntraLase iFS 150 femtosecond laser (Johnson & Johnson Vision).

There were excellent clinical outcomes in both groups, as well as excellent predictability. There was no difference in the induction of higher order aberrations between the two groups. However, there was 25% better contrast acuity in the WFG group and greater gains in CDVA in the WFG group. Additionally, he noted better UDVA at 20/16 or better in the WFG group.

Dr. Manche discussed LASIK vs. SMILE. LASIK is the most commonly employed option for laser vision correction surgery, with more than 30 million performed worldwide to date. SMILE is a newer modality that is becoming more widely adopted, with approximately 750,000 treatments performed worldwide to date.

Studies have shown that SMILE and LASIK yield comparable refractive outcomes long term, while short-term outcomes are better with WFG.

Dr. Manche discussed a study at Stanford comparing SMILE and LASIK. The study was a prospective study, with a planned enrollment of 140 eyes of 70 patients. It was contralateral, and each eye was randomized to either WFG LASIK or SMILE. Eyes were randomized by ocular dominance. WFG LASIK was performed with the CustomVue platform, and SMILE surgery was performed with the VisuMax 500 Hz femtosecond laser (Carl Zeiss Meditec). All LASIK flaps were created with the IntraLase iFS 150 femtosecond laser.

The study concluded that there were excellent clinical outcomes with WFG LASIK and SMILE and excellent predictability in both groups. There was faster visual recovery in the WFG LASIK group and better UDVA at 20/16 or better in the WFG LASIK group. Study enrollment is ongoing, Dr. Manche noted.

In conclusion, Dr. Manche said that wavefront-guided LASIK using the iDesign offers outstanding clinical results. Multiple peer-reviewed papers demonstrate advantages of wavefront-guided LASIK surgery over wavefront-optimized LASIK surgery, he said. LASIK and SMILE have been reported to have similar outcomes, and more recent literature suggests that wavefront-guided LASIK and topography-guided LASIK may have somewhat better outcomes than those with the current SMILE surgery.

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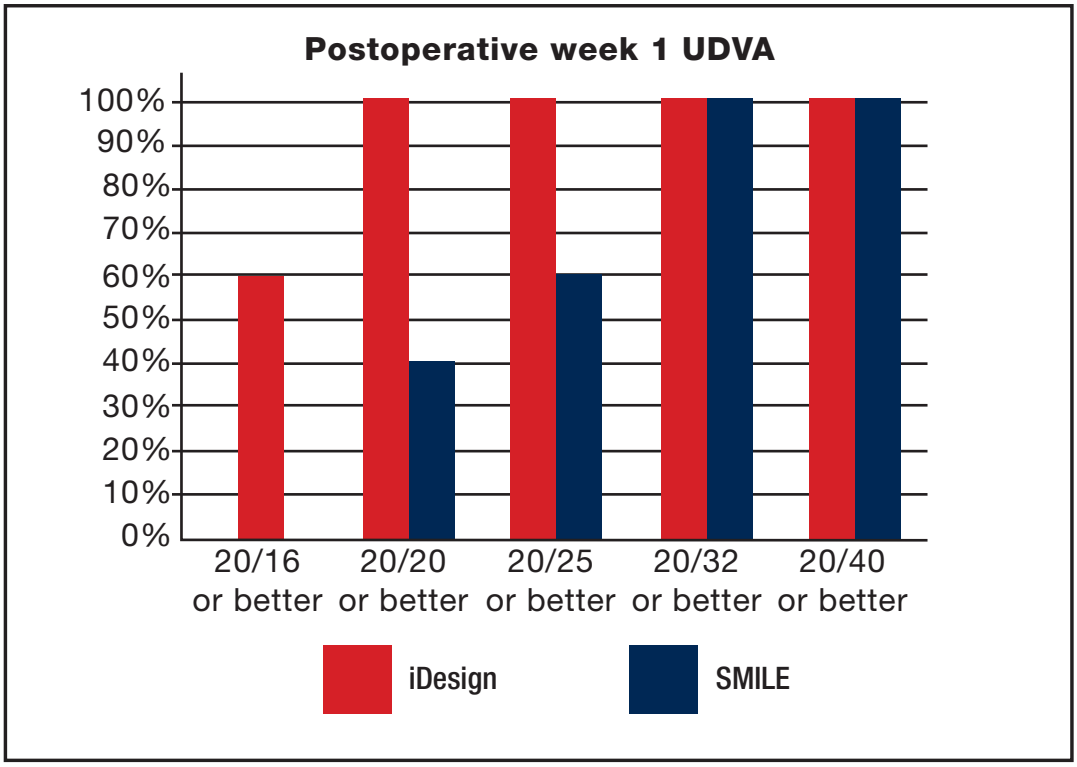

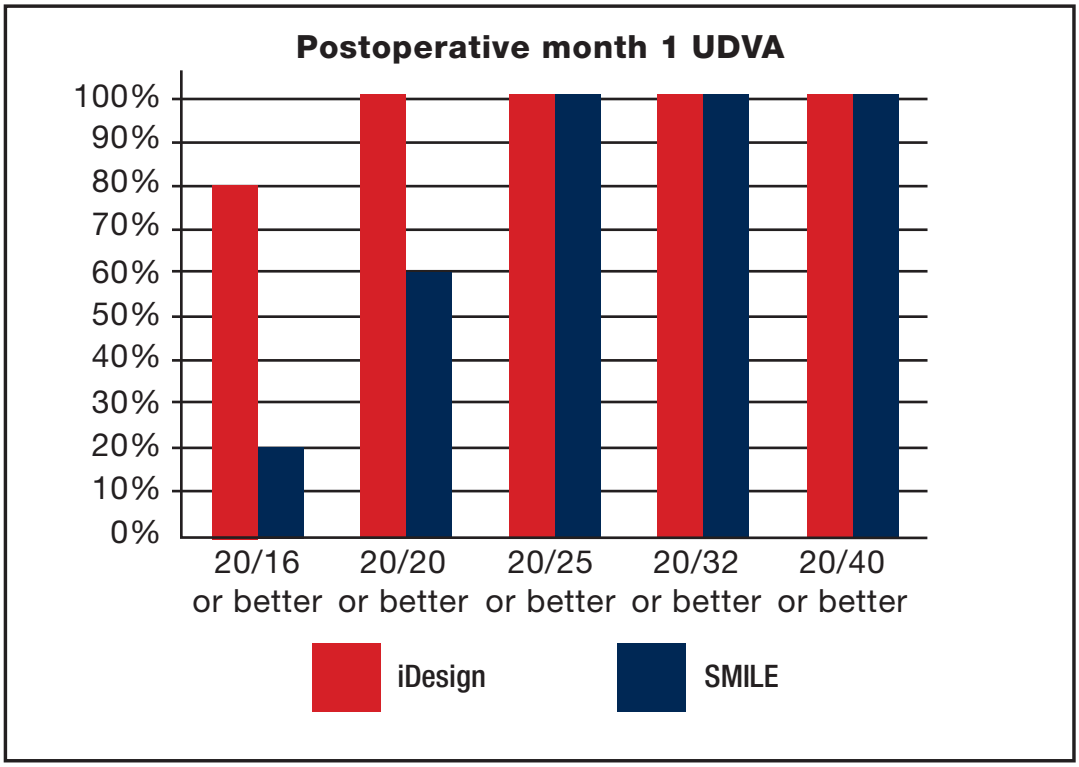

Dr. Manche's study concluded that there were excellent clinical outcomes with WFG LASIK and SMILE and excellent predictability in both groups. There was faster visual recovery in the WFG LASIK group and better UDVA at 20/16 or better in the WFG LASIK group compared to SMILE.

Source: Edward Manche, MD

Real world results and case reports with custom LASIK

Dr. He first shared information on customized ablation profiles, indicating that the CustomVue WFG platform (Johnson & Johnson Vision) has a broader range of treatment up to –11.0 D of spherical equivalent and up to –5.0 D cylinder.[4] CustomVue also showed the greatest improvement in mesopic contrast sensitivity.

Dr. He discussed a study whose objective was to evaluate the clinical outcomes of LASIK for the correction of myopia performed with the CustomVue platform. The study included 378 eyes from 189 patients.

In the study, 95.2% of eyes achieved 20/20 UDVA postoperatively at 3 months. Additionally, Dr. He said that 36.8% of eyes gained one line of CDVA at 3 months postoperatively. There was no significant increase in higher order aberrations (HOA) and spherical aberration.

In conclusion, he said that custom LASIK is highly effective, safe, and predictable in treating myopia with or without astigmatism. The significant findings were that 95.2% of eyes achieved 20/20 UDVA postop at 3 months, there was significant reduction in total RMS, and no significant increase in spherical aberrations.

Dr. He went on to discuss several case presentations of patients with prior LASEK. The first was a 32-year-old male treated in 2004 with LASEK. At 1 year postop, the patient had regression with haze. He was treated again with LASEK with MMC in 2005. The patient was satisfied with his results after the second treatment. However, 12 years later, the

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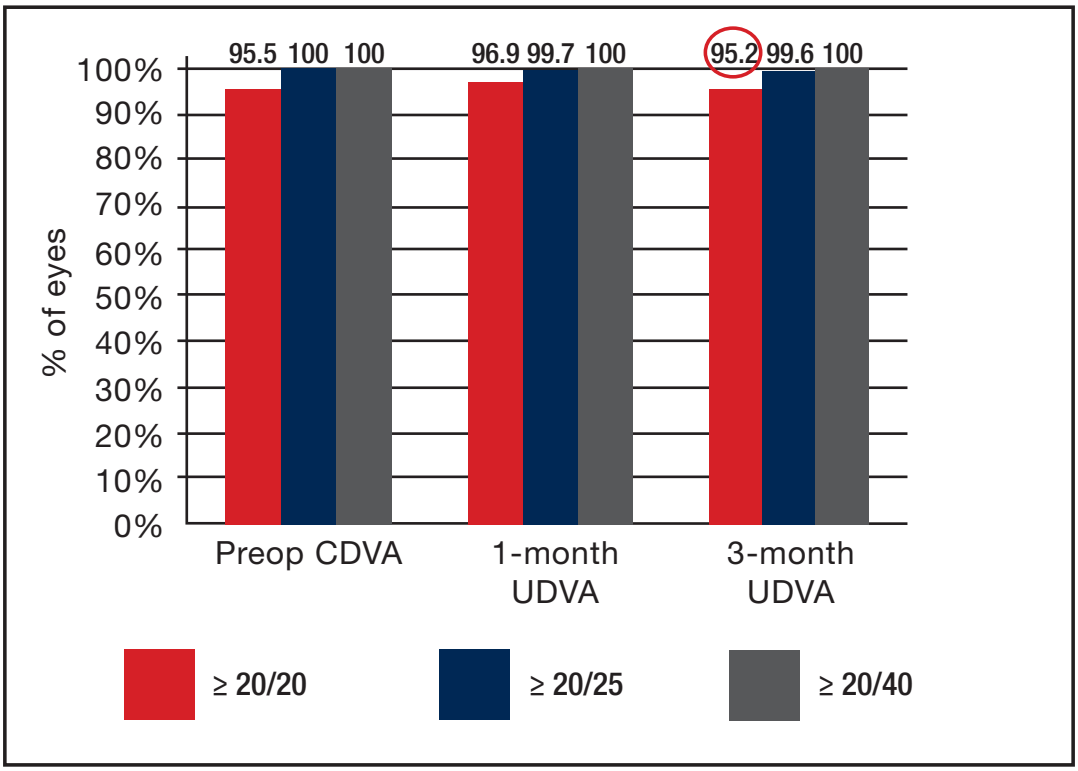
patient came back with a problem in his right eye. Dr. He successfully used CustomVue LASIK in the case.

Dr. He shared cases of a 23-year-old female patient and a 22-year-old male patient, both with high astigmatism, in whom he used the CustomVue. He discussed hyperopia treatment, noting HOA increased after hyperopia treatment (but the patient was still satisfied). Dr. He stressed the ability of iDesign to capture post-ICL wavefront images easily and to capture high quality images with aberrated corneas.

Dr. He shared 7 points for why he sticks with WFG LASIK: quick visual recovery, improved quality of vision, accuracy, broader range of treatment, high quality with aberrated corneas, easy enhancement, and WFG/PRK LASIK.



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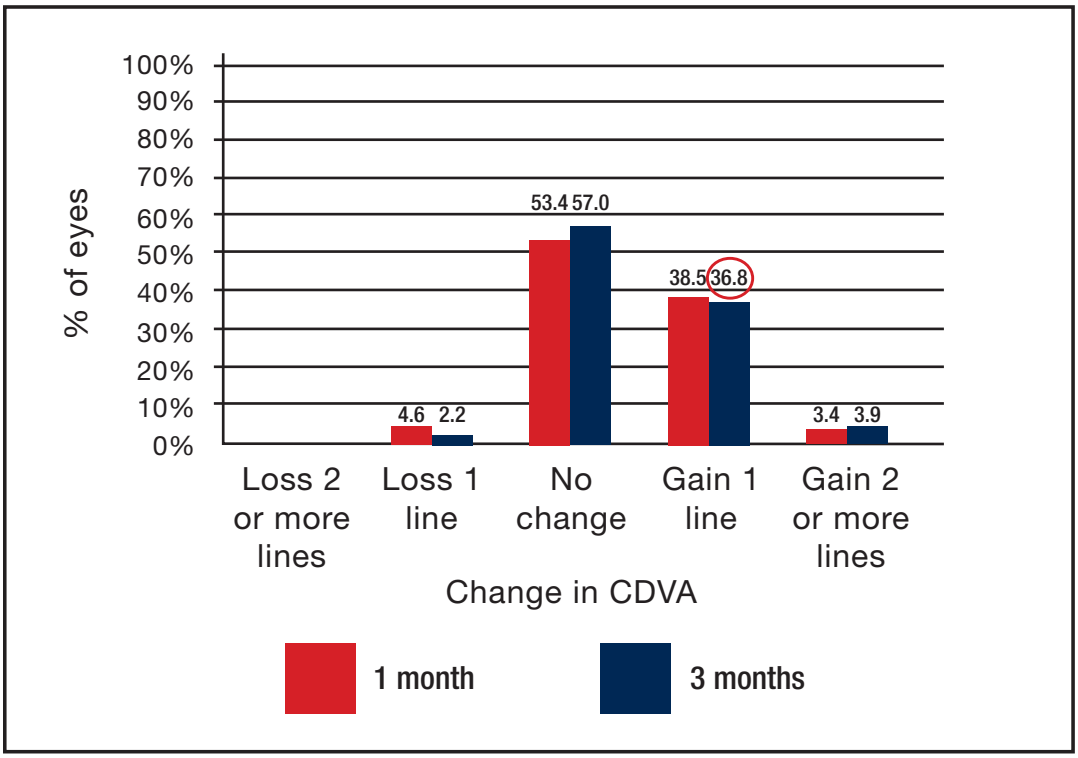

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