Advanced Conventional Ablations

Laser upgrade offers opportunities for manifest–refraction-based treatment of patients with refractive multifocal IOLs, corneal scars, and other special indications.

BY JULIAN D. STEVENS, MRCP, FRCS, FRCOPHTH

Over the years, significant advances have been made to the Visx laser platform as well as to CustomVue wavefront-guided treatments (both by Abbott Medical Optics Inc.). Certain treatments, however, were not available for cases in which a wavefront map could not be captured or the surgeon did not want to perform a wavefront-guided treatment. A new software upgrade on the Visx platform now enables surgeons to offer advanced conventional ablations for a wider range of indications.

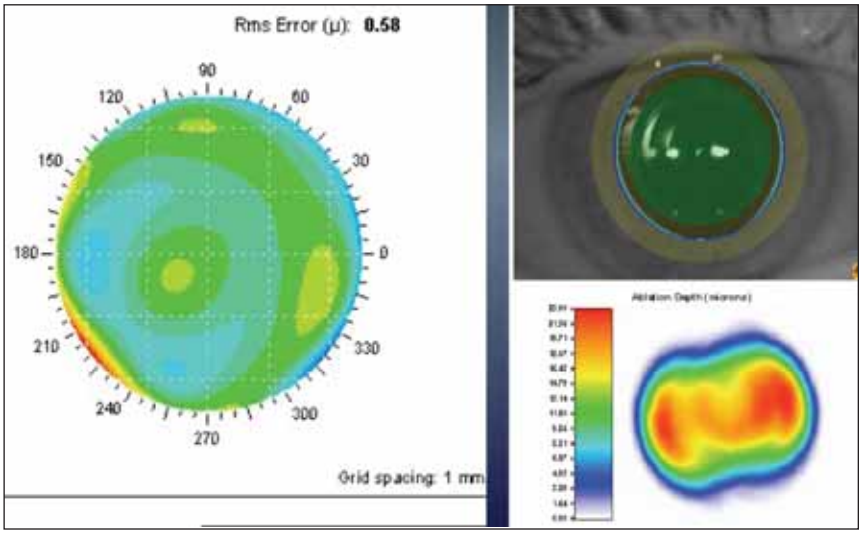

Figure 1. A wavefront-designed correction could eliminate the multifocality of a ReZoom refractive multifocal IOL.

VSS-R INDICATIONS

This upgrade makes the laser compatible with Variable Spot Scanning-Refractive (VSS-R) cards for nonwavefront treatments and with the iDesign wavefront sensor for the most advanced wavefront-guided treatments. There are two primary indications for VSS-R treatments: (1) cases in which wavefront data are unavailable or of poor quality and (2) when a wavefront-guided treatment is undesirable. The leading indication for VSS-R treatments in Europe is the presence of a refractive multifocal IOL such as the ReZoom (Abbott Medical Optics Inc.) or the Lentis Mplus

TAKE-HOME MESSAGE

- The primary indications for VSS-R are when wavefront data are unavailable or of poor quality and when a wavefront-guided treatment is undesirable.
- VSS-R can treat a wide area and achieve subtle shape correction with smaller spots.
- VSS-R is not meant to replace wavefront-guided treatment for primary, uncomplicated cases.

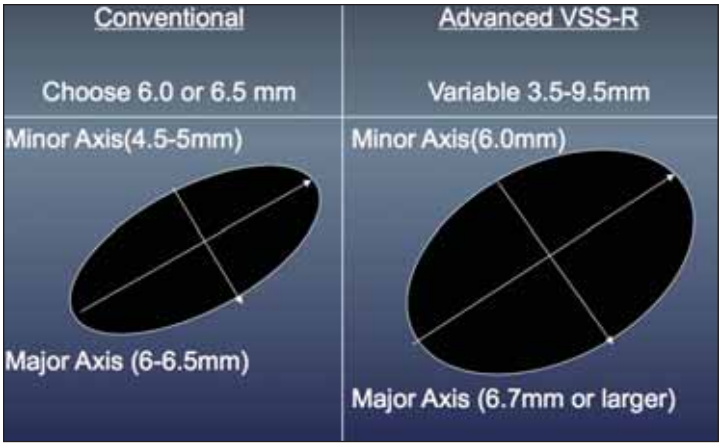

Figure 2. Comparison of conventional ablation and advanced VSS-R optical zones.

(Oculentis GmbH) in a pseudophakic patient. The treatment is performed either as a postoperative enhancement or as part of a planned bioptics procedure.

Like many surgeons, I prefer planned bioptics with a multifocal IOL for patients with significant astigmatism. However, a wavefront-guided ablation should not be used in such cases because it removes or reduces the lens' multifocality (Figure 1). In these cases, the VSS-R treatment is a safe choice. Even when a bioptics treatment is not planned, residual ametropia requiring a laser enhancement may be present after surgery. The VSS-R treatment will preserve the desired multifocality of the refractive multifocal lens in these cases.

> Very high myopes or patients who do not have enough corneal tissue after PKP for a wavefront-guided treatment can benefit from a VSS-R surface ablation treatment.

I expect that there will also be a need for laser enhancement after implantation of accommodating IOL models. Because these lenses are designed to move in the eye, accommodating IOLs are inherently less predictable for sphere. However, the surgeon may not want to alter the spherical aberration characteristics of the accommodating IOL with a wavefront-guided treatment.

Very high myopes or patients who do not have enough corneal tissue after penetrating keratoplasty (PKP) for a wavefront-guided treatment can benefit from a VSS-R surface ablation treatment. In such cases, often the aim is to treat astigmatism. Alternatively, the surgeon can correct high myopia with a contact lens or a phakic IOL and use VSS-R to correct cylinder. For many patients, this combination may dramatically improve visual acuity and quality of vision and preserve corneal tissue.

Other indications include patients with corneal scars and those with early lenticular changes who want a laser correction for cylinder or monovision but will need lens surgery at a later date.

A MODERN ALGORITHM

VSS-R provides a wide optical zone (Figure 2) and an advanced treatment algorithm. This combination is a great improvement over conventional single-path, multizone concentric ablations. As its name suggests, the VSS-R algorithm includes variable spot scanning; laser spots vary from 6.50 to 0.65 mm, but the effective minimum is 1.00 mm to avoid diffraction effects with small apertures. VSS-R can treat a wide area and achieve subtle shape correction with smaller spots. The treatment is essentially a low-order CustomVue treatment based on the manifest refraction. The software also includes a variable repetition rate to protect against corneal thermal damage. The pulse-packing algorithm is choreographed with the pulse-generation algorithm to provide the most efficient pulse delivery.

As with CustomVue, VSS-R also has an offline programming module. Wavefront scans can be incorporated for reference, but the sphere and cylinder guide the ablation. Options for optical and blend zones and defaults are the same as with CustomVue.

CONCLUSION

VSS-R is the modern algorithm for nonwavefront-guided treatments that surgeons have always wanted on the Visx Star laser. This algorithm, however, is not meant to replace wavefront-guided treatment for primary, uncomplicated cases. The wavefront-guided approach still maximizes the probability of achieving the best possible outcomes for these patients. Only a wavefront-guided algorithm can precisely register the treatment to correct for x-y axis shifts or cyclorotation. ■

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