

MALONEY VISION INSTITUTE CLINICAL UPDATE

Therapeutic Wavefront Treatment of Irregular Astigmatism after Refractive Surgery

Corneal laser treatment can sometimes result in irregular astigmatism. This can be caused by a decentered ablation, irregularity in the laser energy applied on the cornea, or irregular healing of the cornea postoperatively. This results in higher-order aberrations, which cannot be corrected by conventional spherical or astigmatic corrections.

Recently, wavefront-guided laser treatments are showing promise in treating such irregularities. We present a case in which therapeutic wavefront-guided LASIK was used to treat a reduction in best-corrected vision caused by conventional laser treatment.

The patient, a 43 year old male, presented with a complaint of reduced quality of vision in his left eye following a LASIK procedure in 1999. His preoperative refraction OD was -5.50 DS, correcting the eye to 20/20, and OS was -5.75 DS, correcting to 20/20. He had a LASIK procedure OU with LASIK enhancement OS. When he presented to us uncorrected vision was 20/20-2 OD and 20/40 OS. Manifest refraction OS was -0.50 -0.25 x 070, yielding 20/40- vision.

Corneal topography OS (Figure 1) reveals a centered laser treatment without obvious topographic abnormalities. However, the waveprint map of the left eye (Figure 2) shows a greater than average higher-order aberrations, with RMS value of 0.55; the normal value is usually less than 0.35.

The patient was enrolled in our FDA trial of wavefront-guided treatment after prior laser surgery. The information from the waveprint map was transferred to the VISX laser for a custom therapeutic ablation.

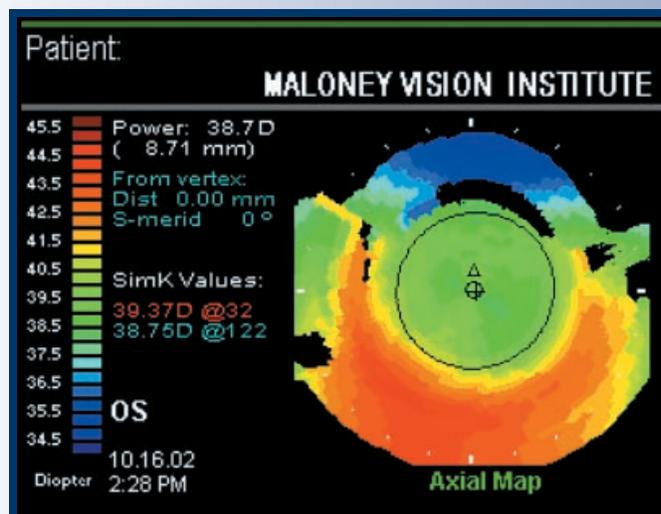


Figure 1:

This post-LASIK topography map of the left eye, showing a central area of myopic ablation without obvious topographic irregularity.

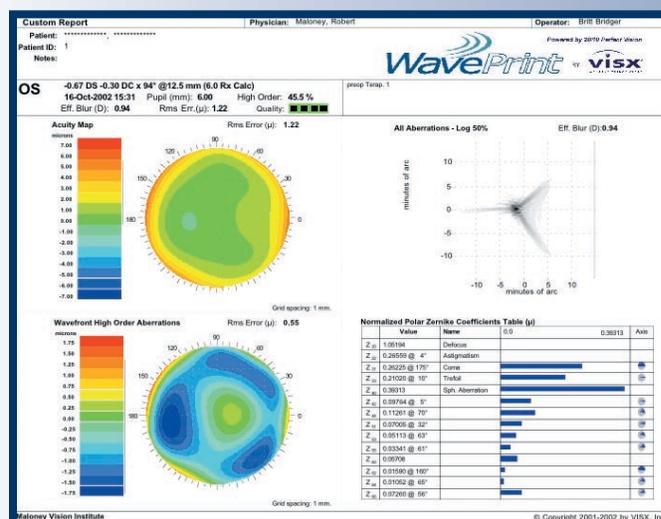


Figure 2:

This post-LASIK Wavescan map of the left eye reveals minimal residual refractive error (upper left map), but significant higher-order aberrations (lower left map). The RMS value of the higher order aberration was 0.55. The visually significant aberration was mostly spherical aberration. (Lower right graph)

Postoperatively, the patient's complaint of glare at night was dramatically improved. Manifest refraction postoperatively was +1.00 – 0.50 x 180 and BCVA had improved OS to 20/25. The postoperative waveprint map shows a reduction in higher-order aberrations, with a RMS value of 0.45 (Figure 3).

Discussion:

Patients who suffer from induced irregular astigmatism, a reduction in best-corrected vision, or a loss of quality of vision from previous laser procedures can be helped by wavefront-guided retreatments.

Therapeutic wavefront treatment utilizes the VISX Wavescan System to map out the entire optical system of the eye and measure lower-order aberrations (sphere and cylinder) along with higher-order aberrations, such as spherical, aberration or coma. This information is programmed into the laser to reduce corneal aberrations, improving quality of vision.

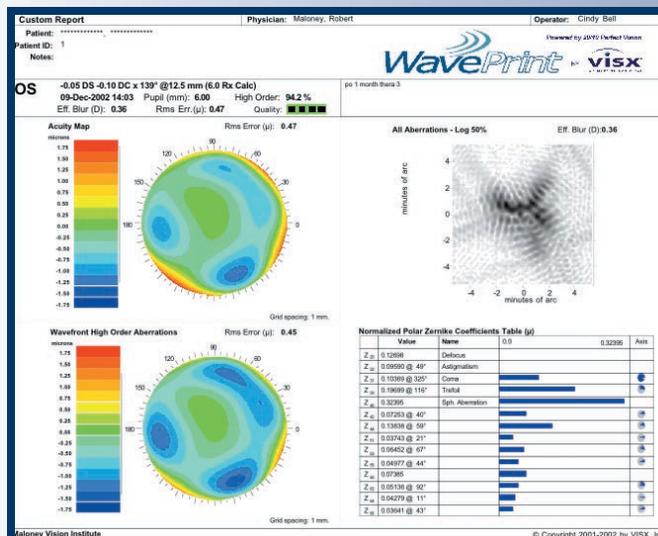


Figure 3:

The Wavescan map of the left eye after custom therapeutic wavefront treatment. The RMS value of higher-order aberrations has decreased to 0.45. Refractive error (upper left) is now close to emmetropia.

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