



Steven Wilson

Custom ablation and femtosecond laser LASIK

Colin Kerr
in Dublin

In the past five years, there have been many improvements in excimer laser delivery including the incorporation of anatomic registration, high-frequency eye trackers, improved laser delivery systems and better patient selection for studies. However, there are significant limitations to the whole principle of custom ablations, according to Steven E Wilson MD.

Dr Wilson, professor of ophthalmology, and director of cornea research at the Cole Eye Institute in the Cleveland Clinic, Cleveland Ohio, addressing the Fourth International Refractive Meeting, referred to the study by Mastropasqua et al (2004) comparing customised PRK and conventional PRK in 60 patients. (Mastropasqua L, Nubile M, Ciancaglini M, Toto L, Ballone E. *J Refract Surg.* 2004 Sep-Oct;20(5):422-31)

The study reported a smaller increase in higher order aberrations in the wavefront-guided PRK group compared to the conventional PRK group. Dr Wilson said no statistically significant difference was noted when other visual parameters were compared including spherical equivalent, uncorrected visual acuity, or best spectacle corrected visual acuity.

He also referred to studies by Kim et al (Kim TI, Yang SJ, Tchah H. *J Refract Surg.* 2004 Sep-Oct;20(5):432-8. 2004) and Phusitphoykai et al (Phusitphoykai N, Tungsiripat T, Siriboonkoom J, Vongthongsri A. *J Refract Surg.* 2003 Mar-Apr;19(2 Suppl):S217-20.)

There are significant limitations, he said, to the whole principle of custom ablations. "Wavefront-guided ablations do not treat all the higher order aberrations and they induce some postoperative higher order aberrations. Every time we do a refractive procedure whether it is LASEK or PRK or LASIK, we have some induction of higher order aberrations and this is true even with custom ablations."

Dr Wilson said there are daily fluctuations in the wavefront aberrations and aberrations vary with pupil size. Aberrations, he said, change with age and variations in aberrations occur with accommodation. He also pointed out that wound healing and biomechanical changes alter aberrations after surgery.

"When you add all of these together, how can this possibly be a meaningful application? Having said all that, except in the case of patients where I am concerned about the 20 to 40 per cent additional tissue that is removed, over the last four years I have come to the point where I use custom ablation on everyone that I feel is a good candidate. Some of the advantages that I see to it is that after

doing wavefront-derived refractions and traditional refractions on hundreds of patients (we do both methods on every patient), the wavefront method has gotten so good that when there is a disparity between the technician-derived refraction and the wavefront-derived refraction, when I go back and check, almost always it is the wavefront refraction that was right," said Dr Wilson. If they are, overall, a good candidate for LASIK, I use the custom unless the level of correction and corneal thickness is such that too much tissue would be removed for custom.

Dr Wilson said in terms of the traditional versus custom, he thought the jury was still out as to what we are truly accomplishing with it, and until appropriate studies are designed, we will not truly know the answer to that question. The bottom line is that the traditional ablation has improved so much that these patients have great outcomes, too.

Study compares all laser LASIK vs. conventional

The Cole Eye Institute has carried out research examining whether the femtosecond laser IntraLase is better than conventional microkeratomers for custom wavefront-driven LASIK. A study of 410 eyes of 410 patients, devised by Dr Fabricio Medeiros and coworkers, evaluated the wavefront outcomes of the patients who had undergone LASIK with mechanical microkeratomers (Moria M2 and Hansatome) versus femtosecond laser. All procedures utilised the LADARWave platform (Alcon) with a 6.0mm pupil diameter.

The Post-Pre MR Spherical Equivalent vs. Spherical aberration change showed that the Femtosecond Line was statistically different from the two microkeratomers (IL vs. H $p + 0.015$, IL vs. M $p < 0.001$).

Total aberrations pre-op value vs. postop improvement showed that the Femtosecond and the Hansa lines were not statistically different (IL vs. H $p + 0.53$) but the Moria is statistically different from the other two, mainly due to values that occurred in the higher pre-operative corrections (H vs. M $p = 0.001$ and M vs. IL $p < 0.001$).

For Post-Pre MRSE vs. Total High Order Aberrations, the femtosecond line was statistically better than the two microkeratomers. (IL vs. H $p + 0.014$, IL vs. M $p < 0.001$). Hansa and Moria presented similar results (H v M $p = 0.23$).

The all laser procedure produced statistically superior results to the standard microkeratome LASIK in terms of postoperative spherical equivalence and spherical aberrations. The analysis revealed no statistically significant difference for postoperative total aberrations between

the Hansatome and IntraLase, but did show better results than were obtained with the Moria keratome. The IntraLase also did better in terms of postoperative manifest refraction and total high order aberrations.

"We now agree that the femtosecond laser is more likely to have a better custom result than with the microkeratomers. I think that is due to the planar nature of the flap," he told the meeting.

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