New flap holder allows eye tracking for undersurface re-LASIK ablation

Stefanie Petrou Binder MD in Berlin

SOME investigators believe that a good way to avoid keratectasia after LASIK retreatment is to ablate the underside of the flap instead of re-treating the corneal stroma. A novel instrument used for the undersurface ablation of a LASIK flap could improve outcomes with this approach, according to researchers at the 103rd annual conference of the German Ophthalmology Society (DOG).

The newly designed flap holder prototype SO 1882 (Geuder) holds the opened flap by adhesion through the application of a drop of viscoelastic. A black ring at the centre of the device, built into the metal hand-piece and positioned slightly closer to the hinge, is recognised by the eye tracker as the pupil and enables active eye tracking for undersurface ablation.

German investigators performed undersurface ablation on 12 eyes with the new flap holder and a Bausch & Lomb Technolas 217z flying-spot laser. They reported no decentration, loss of eye tracking intraoperatively, or loss of best-corrected acuity one month after the operation.

Patients wishing an enhancement procedure were eligible for a modified LASIK retreatment procedure if the flaps cut in the initial procedure were thick enough to perform the intended additional ablation on the undersurface, with at least 80 microns of flap thickness remaining.

The researchers treated eyes with a sphere of between +0.5 to -1.5 D and a cylinder of between -1.25 to +1.25 D. The maximum ablation depth was 32 microns. “The LASIK nightmare is keratectasia, the risk of which increases with enhancement procedures on the stromal bed, higher myopia and a thin residual posterior stromal bed. We devised a way to perform re-treatments on the underside of the flap, incurring no additional risk of keratectasia, with this new instrument that allowed eye tracking for the first time to date,” said Suphi Taneri MD, Münster, Germany.

Dr Taneri centred the eye tracker on the mark on the flap, first covering the natural pupil with a sponge to avoid confusing the eye tracker. He performed the ablation with a flying-spot laser on the undersurface of the flap and then repositioned the flap.

He observed that problems with this method could arise in particular with astigmatic ablation. “Detection of the black ring marking on the modified flap holder and continuous tracking of it instead of the real pupil was possible. Ablation with a flying-spot laser on the undersurface of a LASIK-flap is feasible, without decentration. Refractive results in minor corrections were good without nomogram adjustment,” Dr Taneri reported.

Limitations may need to be addressed

Thomas Kohlen MD, Goethe University Eye Hospital, Frankfurt, Germany, pointed out that LASIK surgeons had to be sure whether re-treatments were possible well before the surgery, and that measurements of flap thickness had to be done beforehand, not intraoperatively.

He noted that a technique that does not allow the use of wavefront technology, which is intended to improve the results of LASIK retreatments, was not realistic in the broader scope, except for lower order aberrations. Working with mirror images would be rather complicated, he said.

Dr Taneri explained that undersurface ablation could feasibly be used as the standard procedure for every re-treatment if the flap thickness allowed, pointing out the association between cutting thin flaps and creating new complications such as button holes and flap wrinkles. He explained that it was important that the estimated residual flap thickness after undersurface ablation was greater than 80 microns to avoid these complications.

Dr Taneri noted that patient cooperation was more difficult with this procedure. He noted that the flap could theoretically dry out more quickly than the stroma, potentially leading to overcorrections.

Other surgeons attending the session at the Joint Meeting of the SOE/DOG expressed concern about the reliability of a hand-held instrument when the measurements taken needed to be highly precise.

Martin Wenzel MD, Krankenhaus der Barmherzigen Brüder, Trier, Germany, noted that the movements made by the patient and the surgeon during eye tracking could pose a problem, since the surgeon needs to hold the device onto the eye to use this method.

Dr Taneri explained that in addition to the use of viscoelastic to create adhesion, the flap holder has teeth that fixate the eye ball. He said that even if the surgeon’s hand or the patient moves, the flap moves along with it allowing active tracking.

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