Session 1-C: Refractive: Mechanical and Femtosecond Microkeratomes

Title: Comparison of Visual Outcomes with Femtosecond and Mechanical Keratomes for Wavefront-Guided LASIK

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Purpose: To compare the femtosecond laser to mechanical keratomes (MK) in terms of flap characteristics, refractive and visual outcome, quality of vision and wavefront aberrations.

Methods: Wavefront-guided LASIK was performed with the VISX Star S4 CustomVue (ver 3.07) on 199 eyes (100 subjects) using the femtosecond laser (IntraLase) and 197 eyes (99 subjects) using one of two MKs (Amadeus and Hansatome). Measurements were completed pre-operatively and 1 day, 1 week, 1 and 3 months post-operatively. One-half of the patients in each keratome group received wavefront-guided LASIK in the standard fashion (flaps created, lifted and wavefront-guided excimer laser applied). The other half of the patients had the flaps cut, lifted and immediately laid back into position. These patients had wavefront measurements obtained at the 1 month post operative examination and, based on that measurement, the flaps were lifted and wavefront-guided excimer laser applied.

Results: Flap thickness variance was greater for mechanical keratomes than the femtosecond laser keratome ($p<0.001$). Patients had more symptoms (foreign body and photophobia) on day 1 in the femtosecond laser group ($p<0.001$). However, uncorrected visual acuity was better in the femtosecond group at 1 day and 1 week ($p<0.001$), but not significantly different from MK at 1 and 3 months. Accuracy of refractive correction and best-corrected visual acuity were not significantly different at 3 months. However, both photopic 5% and mesopic 25% contrast acuity were significantly better in the femtosecond group at 1 and 3 months post-op ($p<0.001$). At 3 months, the mean change in both 5% and 25% contrast acuity was +0.03 logMAR (MK; loss) and -0.02 logMAR (femto; improvement). Comparative analysis will be performed between the consecutive and staged approach to determine if taking into account aberrations induced by the creation of the flap results in improved clinical and quality-of-vision outcomes.

Conclusions: The uncorrected visual acuity and refractive accuracy were the same between groups. While patients treated with the femtosecond laser had more symptoms in the early post-operative period, they had faster visual recovery and better contrast acuity. Further analysis will be conducted to determine the contribution of flap-induced aberrations in wavefront-guided LASIK results.