Flap Thickness Architecture Comparison Between Femtosecond and Microkeratome Flaps

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PURPOSE: To compare LASIK regional flap thickness measurements in femtosecond (FS) (Ziemer LDV) and mechanical microkeratome (MK) (Amadeus II) flaps.

METHODS: Regional flap thickness measurements were obtained with Intraoperative ultrasound (US) centrally, and anterior segment Fourier-domain OCT (Optovue Inc) measurements obtained two weeks postoperatively for central and regional measurements at 1.5 and 2.5 mm from the vertex in the horizontal and vertical meridians across the central 5 mm of the cornea in both groups.

RESULTS: There were 56 eyes from 29 patients in the MK group and 56 eyes from 28 patients in the FS group. All MK group eyes could be measured with OCT due to a clear interface delineation at two weeks; however, only 31 eyes from 23 patients in the FS group were able to have accurate OCT measurements performed due to a relatively homogenous appearance in most eyes with only a faint interface delineation. Central flap thickness by OCT was significantly thicker for the FS group than MK group (117.8±12.2 µm vs. 110.6±10.8 µm, p = 0.01) In the MK group, OCT demonstrated excellent correlation with US values centrally (r=0.87) and functionally planar flap architecture (average standard deviation [SD] across flap=4.1 µm). In the FS group, OCT demonstrated poor correlation with US values centrally (r=0.05) and greater variability in flap architecture throughout the central 5 mm of the cornea (average standard deviation [SD] across flap=9.8 µm).

CONCLUSIONS: Corneal flaps created with femtosecond laser were significantly thicker compared to those created with mechanical microkeratome. Both microkeratome and femtosecond flaps were functionally planar, but there was greater variability in the FS group. This may be a real difference or related to challenges in accurately identifying the LASIK interface even as early as two weeks postoperatively due to greater early anterior and posterior lamellae integration.