Evaluation of functional optical zone after LASIK using wavefront derived metrics

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Purpose:
To compare the size of objectively determined functional optical zone (FOZ) with programmed ablation zone settings in eyes treated with laser in situ keratomileusis (LASIK) for myopia.

Methods:
Seventy-two eyes treated with LASIK using the Bausch & Lomb 217z100 excimer laser were retrospectively evaluated in terms of FOZ diameter. Three months postoperatively, ocular aberrations were measured using Imagine Eyes irx3 Shack-Hartmann wavefront analyzer. FOZ was computed from the resulting data by determining the largest pupil size over which the total root mean square (RMS) excluding defocus was consistent with 20/30 or better vision. Preoperative and postoperative FOZ diameters were compared in each eye. The effects of preoperative refraction, attempted sphere correction, and achieved sphere correction on FOZ diameters were analyzed using multiple regression analysis.

Results:
After LASIK, the FOZ decreased by 0.8 ± 0.3 mm in average (p < 0.05). The FOZ size was correlated with the preoperative manifest refraction, attempted correction, and achieved correction (p < 0.05). The reduction in FOZ was significantly correlated with the preoperative manifest refraction, attempted correction, and achieved correction (p < 0.05). Before LASIK, there was no correlation between the FOZ and the preoperative manifest refraction (p=NS).

Conclusion:
The functional optical zone was reduced by myopic correction. Although higher attempted corrections resulted in larger increases in spherical aberration, larger treatment diameters helped to minimize the postoperative spherical aberration. Larger optical zones resulted in better-preserved FOZ.