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Clinical Science

Measurement of corneal aberrations for customization of intraocular lens asphericity: impact on quality of vision after micro-incision cataract surgery.

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Abstract

Aims: To compare the quality of vision of patients with customized-aspheric intraocular lenses (IOL) versus patients implanted with zero-aberration IOL after a 1.8 mm micro-incision cataract surgery (MICS).

Methods: 43 eyes were divided into two groups: 17 eyes (reference group) received zero aberration Acri.Smart 46LC® (Carl Zeiss Meditec, Germany) and 26 eyes received a customized-aspheric IOL: either aspherical Acri.Smart 36A® generating a -0.18 µm SA compensation equivalent, or zero-aberration Acri.Smart 46LC®. IOL asphericity was individually selected according to the corneal spherical aberration (SA) in order to produce a residual ocular SA close to +0.10 µm. Refraction, best-corrected visual acuity (BCVA), contrast sensitivities, ocular wavefront aberrations, and objective quality of vision assessment were analyzed 6 months after MICS.

Results: Postoperative BCVA was similar in both groups (p=0.58). Mesopic contrast sensitivities were significantly better in the custom group at intermediate and high spatial frequencies (p<0.001), while photopic contrast sensitivities were similar. Total SA was significantly lower in the custom group (Z40 = 0.085 ± 0.075 µm versus 0.261 ± 0.091 µm, p<0.001) whereas no difference was found in preoperative corneal SA. Modulation Transfer Function (MTF) cutoff frequency was higher in the custom group than in the reference group (34.3 ± 8.1 c/deg versus 23.57 ± 8.6 c/deg respectively, p=0.008).

Conclusion: Individual selection of IOL asphericity with a preoperative corneal SA measurement allowed control of final ocular SA. Such customization improves mesopic contrast sensitivity, and leads to better objective quality of vision.

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