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Corneal Biomechanical Properties in Normal and Myopic Eyes as Assessed by the Ocular Response Analyzer

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Abstract

Purpose: To evaluate corneal biomechanics in normal and myopic eyes, taking into account the effect of corneal thickness on Ocular Response Analyzer (ORA) measurements. Methods: 52 eyes from 52 healthy subjects in group 1 and 97 eyes from 97 myopic subjects [spherical equivalent (SE) < -5D] were evaluated with ORA, corneal topography, aberrometry and anterior segment optical coherence tomography. Linear regression analysis applied to an independent calibration sample of 103 eyes from 103 identically evaluated, healthy subjects yielded equations relating corneal hysteresis (CH) and corneal resistance factor (CRF) to central corneal thickness (CCT). Difference from the predicted CH and CRF for a given CCT was computed as DifCH and DifCRF for each eye. Results: Significant positive correlations were found between both CH and CRF and CCT in the calibration sample. In group 1 vs group 2, CCT (mean±SEM, 521.0±5.357 vs 515.8±3.545) and average corneal power (ACP) (43.80±0.2436 vs 44.04±0.1809) did not differ significantly, but anterior chamber depth (ACD) was significantly higher in the myopic group (3.068±0.07259 vs 3.228±0.03538, p=0.03). Mean CH (10.02±0.1856 vs 9.466±0.1645, p=0.04) and CRF (9.937±0.1863 vs 9.122±0.1878, p=0.01) were reduced in group 2. Mean DifCRF (0.2402±0.1591 vs -0.4680±0.1690, p=0.01), but not mean DifCH (0.1077±0.1765 vs -0.3546±0.1515, p=0.06), was significantly lower in group 2. SE was positively correlated to DifCRF (r=0.1780, p=0.03) but not to DifCH (r=0.1412, p=0.09). Conclusions: Both CH and CRF were reduced in myopic eyes, but when the influence of CCT was accounted for, only DifCRF remained significantly lower. Both groups had similar mean corneal thickness and curvature, thus intrinsic differences in corneal composition must account for the aforementioned discrepancies in myopic eyes. CRF seems to be a more reliable indicator of biomechanical weakness than CH, and correlation to CCT could increase the usability of both ORA parameters.

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