Border Tissue Morphology is Spatially Associated with Focal Lamina Cribrosa Defect and Deep-Layer Microvasculature Dropout in Open-Angle Glaucoma

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PURPOSE: To investigate the topographic relationship among focal lamina cribrosa (LC) defect, microvasculature dropout (MvD) and border tissue morphology in open angle glaucoma (OAG) eyes using spectral-domain (SD) optical coherence tomography (OCT) and OCT angiography.

DESIGN: Cross-sectional study METHODS: One hundred twenty-six OAG eyes and 97 normal eyes were included. The maximum externally oblique border tissue (EOBT) length was measured by using enhanced depth imaging SD-OCT as well as focal LC defect size. Circumferential MvD width and height ratio were measured using OCT angiography.

RESULTS: Significant correlations were found among the locations of focal LC defect, MvD and maximum EOBT length. The mean absolute locational difference was 29.1° (95% CI, -47.6 to 105.7) between focal LC defect and MvD, 10.0° (95% CI, -79.4 to 99.4) between focal LC defect and maximum EOBT length, and 10.6° (95% CI, -71.1 to 92.3) between MvD and maximum EOBT length. In multivariate logistic regression analysis, a worse VF defect was significantly associated with the presence of focal LC defects and MvDs ($P < .002$; $P = .002$, respectively). MvD circumferential width was associated with glaucoma severity ($R = -0.66$, $P < .001$), whereas focal LC defect size and MvD height ratio were associated with maximum EOBT length ($R = 0.48$, $P < .001$; $R = 0.65$, $P < .001$, respectively) and AL ($R = 0.53$, $P < .001$; $R = 0.52$, $P < .001$, respectively).

CONCLUSIONS: There was a topographical correlation among the locations of focal LC defect, MvD and maximum border length. In addition, the presence of focal LC defect and MvD were also strongly associated with glaucoma severity. Thus, it is thought that focal LC defect and MvD may be biomarkers that reflect glaucoma severity especially at the location of maximum border tissue elongation.

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