Effect of Focal Lamina Cribrosa Defect on Glaucomatous Visual Field Progression

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OBJECTIVE: To evaluate the association between focal, structural defects of the lamina cribrosa (LC) and glaucomatous visual field (VF) progression.

DESIGN: Retrospective, observational study.

PARTICIPANTS: A total of 169 patients with glaucoma (169 eyes) with a range of glaucomatous damage.

METHODS: Serial horizontal and vertical enhanced-depth imaging optical coherence tomography (EDI OCT) B-scans of the optic nerve head were obtained from patients with glaucoma with 5 or more prior Humphrey 24-2 VFs (Carl Zeiss Meditec, Inc, Dublin, CA). The EDI OCT scans were reviewed for the presence of focal LC defects (laminar holes or disinsertions with a diameter >100 µm). The VF progression was defined as having ≥2 significantly progressing test points (with a slope calculated using pointwise linear regression [PLR], worse than -1.0 dB/year at P<0.01). Age, intraocular pressure (IOP), baseline VF mean deviation (MD), disc hemorrhage, and central corneal thickness (CCT) were recorded.

MAIN OUTCOME MEASURES: The relationship between focal LC defects and the rate and risk of VF progression.

RESULTS: Mean age and VF MD at the time of EDI OCT were 69±12 years and -11.49±6.87 dB, respectively. Sixty eyes (36%) progressed according to PLR criteria. Progression was more common in eyes with, rather than without, focal LC defects (38/81 eyes [47%] vs. 22/88 eyes [25%; P = 0.003]). Among the evaluated parameters, the presence of focal LC defects, disc hemorrhage, higher mean follow-up IOP, greater number of VFs, and longer follow-up period were significantly associated with VF progression in the multivariable analyses (odds ratios, 2.90, 4.66, 1.22, 1.25, and 1.27, respectively; P = 0.010, P = 0.002, P = 0.002, P<0.001, and P<0.001, respectively). The mean global progression rate was significantly faster in the group with focal LC defect than in the group with no focal LC defect (-0.54±0.99 dB/year vs. -0.28±0.52 dB/year; P = 0.031). Among the 60 progressing eyes, despite no significant difference in the mean number of progressing VF points per eye (6.7±7.0 vs. 6.5±4.4; P = 0.899), the mean localized progression rate was significantly faster in the eyes with focal LC defects than in the eyes with no focal LC defects (-2.85±1.85 dB/year vs. -1.75±0.56 dB/year; P = 0.009).

CONCLUSIONS: Focal LC defects are strongly associated with glaucomatous VF progression, and eyes with focal LC defects tend to progress faster than those without.