Rates of Local Retinal Nerve Fiber Layer Thinning before and after Disc Hemorrhage in Glaucoma

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PURPOSE: To investigate longitudinal temporal and spatial associations between disc hemorrhage (DH) and rates of local retinal nerve fiber layer (RNFL) thinning before and after DHs.

DESIGN: Longitudinal, observational cohort study.

PARTICIPANTS: Forty eyes of 37 participants (23 with glaucoma and 17 with suspect glaucoma at baseline) with DH episodes during follow-up from the Diagnostic Innovations in Glaucoma Study and the African Descent and Glaucoma Evaluation Study.

METHODS: All subjects underwent optic disc photography annually and spectral-domain optical coherence tomography (OCT) RNFL thickness measurements every 6 months. The rates of RNFL thinning were calculated using multivariate linear mixed-effects models before and after DH.

MAIN OUTCOME MEASURES: Rates of global and local RNFL thinning.

RESULTS: Thirty-six eyes of 33 participants with inferior or superior DHs were analyzed. The rates of RNFL thinning were significantly faster in DH quadrants than in non-DH quadrants after DH (-2.25 and -0.69 μm/year; P < 0.001). In the 18 eyes with intensified treatment after DH, the mean rate of RNFL thinning significantly slowed after treatment compared with before treatment in the non-DH quadrants (-2.89 and -0.31 μm/year; P < 0.001), but not in the DH quadrants (-2.64 and -2.12 μm/year; P = 0.19). In 18 eyes with unchanged treatment, the rate of RNFL thinning in the DH quadrant was faster after DH than before DH (P = 0.008). Moreover, compared with eyes without a treatment change, intensification of glaucoma treatment after DH significantly reduced the global, non-DH quadrants, and DH quadrant rates of RNFL thinning after DH compared with before DH (global, P = 0.004; non-DH quadrant, P < 0.001; DH quadrant, P = 0.005). In the multiple linear regression analysis, treatment intensification (β, 1.007; P = 0.005), visual field mean deviation (β, 0.066; P = 0.049), and difference in intraocular pressure before and after DH (β, -0.176; P = 0.034) were associated significantly with the difference of global RNFL slope values before and after DH.

CONCLUSIONS: Although the rate of RNFL thinning worsened in a DH quadrant after DH, glaucoma treatment intensification may have a beneficial effect in reducing this rate of thinning.