

Qualitative and quantitative morphologic changes in the vasculature and extracellular matrix of the prelaminar optic nerve head in eyes with POAG

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PURPOSE: To analyze the vasculature and extracellular matrix changes in the prelaminar region (PreLR) of the optic nerve head (ONH) and in the peripapillary sclera of eyes with primary open-angle glaucoma (POAG) and age-matched control eyes.

METHODS: In histologic sagittal sections of 46 eyes with POAG and 45 control eyes (donor ages, 20-96 years), the peripapillary sclera and penetrating vessels were investigated ultrastructurally and with antibodies against elastin, podocalyxin, and α -actin. Within the PreLR, the number and density of capillaries and the thickness of their connective tissue sheaths (CTSs) were quantified. The composition of the CTS was analyzed by using antibodies against collagen types I, III, IV, and VI, and elastin. Areas within the PreLR containing capillaries with thick or thin CTSs were determined.

RESULTS: There were no glaucomatous changes in the peripapillary elastic fibers and in the arterial capillaries in the periphery of the PreLR. In the center of the PreLR, the capillaries gained a CTS that was significantly thicker in POAG eyes than in control eyes, and the area containing capillaries with thick CTSs was significantly larger. These data did not correlate with axon counts.

CONCLUSIONS: Lack of glaucomatous changes in elastic fibers of the scleral suspension of the ONH seems to prevent occlusion of penetrating vessels. In the PreLR, thickening of the capillary CTS and enlargement of the area containing capillaries with thickened CTS could increase diffusion time and may impair nutrition of the neuronal tissue.

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