

Laminar and prelaminar tissue displacement during intraocular pressure elevation in glaucoma patients and healthy controls

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OBJECTIVE: To determine the response of the anterior lamina cribrosa and prelaminar tissue to acute elevation of intraocular pressure (IOP) in glaucoma patients and healthy subjects.

DESIGN: Prospective case-control series.

PARTICIPANTS AND CONTROLS: Patients with open-angle glaucoma (n = 12; mean age±standard deviation [SD], 66.8±6.0 years), age-matched healthy controls (n = 12; mean age±SD, 67.1±6.2 years), and young controls (n = 12; mean age±SD, 36.1±11.7 years).

METHODS: One eye was imaged with spectral-domain optical coherence tomography to obtain 12 high-resolution radial scans centered on the optic disc. Imaging was repeated at precisely the same locations with an ophthalmodynamometer held perpendicular to the globe via the inferior lid to raise the IOP. A line joining Bruch's membrane opening in 4 radial scans was used as reference in the baseline and elevated IOP images. The vertical distance from the reference line to the anterior prelaminar tissue surface and anterior lamellar surface was measured at equidistant points along the reference line in the 2 sets of images. The difference between the 2 sets of corresponding measurements were used to determine lamellar displacement (LD) and prelaminar tissue displacement (PTD).

MAIN OUTCOME MEASURES: Lamellar displacement and PTD.

RESULTS: Intraocular pressure elevation among patients, age-matched controls, and young controls was similar (mean±SD, 12.4±3.2 mmHg). The mean±SD LD and PTD were 0.5±3.3 μm and 15.7±15.5 μm, respectively. The LD was not statistically different from 0 (P = 0.366), but PTD was

CONCLUSIONS: In glaucoma patients and controls, the anterior lamellar surface is noncompliant to acute IOP elevation. Acute optic disc surface changes represent compression of prelaminar tissue and not lamellar displacement.

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