The Relative Odds of Progressing by Structural and Functional Tests in Glaucoma

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PURPOSE: The purpose of this study was to evaluate the effect of disease severity and number of tests acquired during follow-up on the relative odds of identifying progression by structural or functional tests in glaucoma.

METHODS: This was an observational cohort study involving 462 eyes of 305 patients with glaucoma and 62 eyes of 49 healthy subjects. Glaucoma patients and healthy subjects were followed for an average of 3.6 ± 0.9 and 3.8 ± 0.9 years, with a median (interquantile range) of 8 (6-9) and 7 (6-8) visits, respectively. At each visit, subjects underwent visual field assessment with standard automated perimetry (SAP) and retinal nerve fiber layer (RNFL) evaluation by spectral-domain optical coherence tomography (SD-OCT) . Slopes of change in SAP mean sensitivity and OCT RNFL thickness over time were estimated by linear regression using progressively cumulative visits over time. Cutoff values for age-related expected rates of change for each test were obtained from the healthy group. Progression by SD-OCT and/or SAP was determined if the slope of change was statistically significant and also lower (faster) than the fifth percentile cutoff calculated from the healthy group. A generalized estimating equation logistic regression model was used to evaluate the relative odds of progressing by OCT versus SAP in glaucoma eyes.

RESULTS: Eyes with less severe disease at baseline had a higher chance of being detected as progressing by SD-OCT but not by SAP, whereas an increase in disease severity at baseline increased the chance that the eye would be detected as progressing by SAP but not SD-OCT. Each 1 dB higher MD was associated with a 5 % increase in the odds of detecting progression by SD-OCT versus SAP (odds ratio = 1.05 per 1 dB; 95 % confidence interval: 1.01-1.09; P = 0.005) .

CONCLUSIONS: The ability to detect glaucoma progression by SAP versus SD-OCT is significantly influenced by the stage of disease. Our results may provide useful information for guiding clinicians on the relative utility of these tests for detecting change throughout the disease continuum.

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