

Investigation of hearing loss as a modifier of visual field damage with regards to functional outcomes in glaucoma

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Purpose: Glaucoma patients with greater levels of visual field (VF) loss have previously been shown to have more driving limitations, reduced quality of life, difficulty with gait and balance, and decreased physical activity. As glaucoma patients tend to be older, hearing loss is also an important concern and previous work has suggested an association between VF loss and hearing loss in this population. Here, we investigate whether hearing loss modifies the effect of VF loss on key functional outcomes.

Methods: Functional outcomes including: 1) average number of daily steps taken over 7 days, 2) questionnaire data pertaining to fear of falling, quality of life, driving limitations, and driving status, 3) gait parameters (velocity and stride length), and 4) balance (measured as the root mean square sway) were obtained in 195 patients. Severity of VF damage was determined using IVF sensitivity; better-ear hearing sensitivities at frequencies of 500, 100, 2000, and 4000 Hz were averaged to determine the degree of hearing loss. The effect of hearing loss on the association of VF loss with the aforementioned functional outcomes was examined using regression models adjusted for age, race, gender, comorbidity, and polypharmacy.

Results: The prevalence of hearing loss, defined as a speech pure tone frequency average greater than 25 dB in the better ear, was 40%. In models not incorporating visual measures, hearing loss was not observed to be associated with any of the functional outcomes studied ($p > 0.05$ for all). In multivariate analyses evaluating for interactions between hearing loss and VF loss, greater VF loss was noted to be more strongly associated with more driving limitations at greater degrees of hearing loss ($p = 0.017$ for interaction term). Hearing loss did not significantly affect the association of VF loss on the number of daily steps, quality of life score, fear of falling score, driving status, gait variables, and balance variables ($p > 0.1$ for all).

Conclusions: Glaucoma patients with severe VF loss and concomitant hearing loss are more likely to experience driving limitations, though hearing loss did not influence the relationship between VF loss and other functional outcomes.