

EVALUATING QUALITY OF LIFE IN GLAUCOMA

Understand the impact of the disease to improve care.

BY FELIPE A. MEDEIROS, MD, PhD



As a major cause of vision loss, glaucoma can affect several aspects of patients' quality of life (QOL) and impair their performance of a broad array of activities of daily living such as reading, walking, and driving.¹⁻⁸ Patients with glaucoma may be at increased risk of falls and motor vehicle crashes, two of the leading causes of injury-related death in the elderly.⁹⁻¹³ Because currently available treatments for glaucoma may have side effects, eye care providers' knowledge of when and how the disease produces disability is important. The need to slow the rate of functional deterioration to prevent disability should dictate the aggressiveness of treatment.

RATE OF DECLINE

Recent studies have clarified the relationship between progressive structural and functional loss in glaucoma and QOL.¹⁴⁻¹⁹ The rate of visual field loss on standard automated perimetry (SAP) has been shown to be significantly associated with the progressive decline of patient-reported QOL, as assessed by the National Eye Institute Visual Function Questionnaire. Interestingly, even for people

with the same amount of visual field loss, those who had faster rates of change reported a worse decline, suggesting that the velocity at which these defects develop is critically important in determining the impact of disease on QOL.^{16,17} Patients with slowly progressing disease may have more time to adapt to their limited functional status by developing compensatory strategies, making them less likely to report a decline in QOL; however, the nature and effectiveness of these compensatory behaviors have not yet been fully elucidated.

In another study, rates of change in retinal nerve fiber layer thickness, measured with optical coherence tomography, were also associated with change in QOL, even after adjustment for the amount of visual field loss over time. This finding suggests that assessing structural damage may provide information for predicting change in QOL in addition to what can be gathered by perimetry.¹⁵

QUESTIONNAIRES

The use of questionnaires to evaluate glaucoma's impact on the activities of daily living has limitations. There is considerable subjectivity involved in patient-reported outcomes and patients' assessment of their disability. To



Figure 1. Driving simulator from the Visual Performance Laboratory at the University of California, San Diego.

address this problem, some investigators have proposed the use of performance-based measures such as the Assessment of Disability Related to Vision.^{8,20-23} This scale includes several tasks that are intimately related to everyday activities such as reading small print, using a calculator, dialing a phone, finding objects, and putting a stick into holes of different sizes. The measurement also assesses mobility. A cross-sectional study of glaucoma patients showed a significant correlation of this scale's measures with visual acuity, contrast sensitivity, and visual field damage in glaucoma.⁸

DRIVING CONCERNS

An inability to drive is another major concern for patients with glaucoma and for good reason: in many regions, driving is fundamental to maintaining independent living and QOL. Driving cessation is associated with a higher risk of depressive symptoms, social isolation, and entry into long-term care.

Previous studies have indicated that glaucoma patients are at increased risk of motor vehicle crashes, but traditional tests such as SAP have shown only a limited ability to predict driving impairment.^{2,10-12,24-26} More recent investigations have proposed alternative strategies for predicting driving risk in patients with glaucoma, including useful field of view²⁷; driving simulator metrics; and mobile platforms that evaluate visual processing speed, attention, and contrast sensitivity.^{11,12,28} These tests evaluate aspects of vision relevant to driving that are not fully assessed by the simple white-on-white testing stimulus of SAP.

In recent investigations, my colleagues and I demonstrated that a combined approach evaluating processing speed, attention, and contrast detection during simulated driving tasks (Figure 1) performed significantly better than conventional metrics for predicting motor vehicle crashes in patients with glaucoma.¹² In a subsequent study, we demonstrated that longitudinal changes on our proposed



Figure 2. Subject being tested on the virtual reality environment for assessment of balance and postural control at the Visual Performance Laboratory at the University of California, San Diego.

metrics were able to predict police-reported motor vehicle crashes in this population.¹¹ I should note, however, that there is still a paucity of longitudinal prospective studies evaluating driving risk in patients with glaucoma and that, as a result, there are no currently available evidence-based guidelines for assessing driving fitness in patients with the disease. Although many patients with glaucoma cease to drive out of concern about safety, many people with advanced disease continue to drive, even after a previous collision, subjecting themselves and society at large to increased morbidity and mortality.^{9,29}

FALL RISK

Because of the important role of vision in balance control and environment navigation, it is not surprising that glaucoma has been implicated as a risk factor for falls.³⁰⁻³² The disease has been noted to impair people's balance and walking ability, and patients with bilateral vision loss bump into objects more frequently. These factors may result in the two- to fourfold higher risk of falls in glaucoma patients compared to healthy subjects, as noted in



AT A GLANCE

- Glaucoma can affect patients' quality of life and impair their performance of a broad array of activities of daily living such as reading, walking, and driving.
- The rate of visual decline affects how patients rate their quality of life. They rate their quality of life lower if the loss happens quickly.
- New technologies are improving eye care providers' ability to assess driving impairment and fall risk.

WATCH IT NOW

GT's Chief Medical Editor, Steven Vold, MD, tried out a driving simulator in the Shiley Eye Institute's Visual Performance Laboratory.



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previous studies.³⁰⁻³² Despite these associations, evidence has shown only a relatively weak correlation between peripheral visual field loss measured by SAP and risk of falls, which may be related to an inadequate ability of this test to evaluate the complex demands put on vision for adequate postural control during daily activities and in challenging lighting conditions.

A recent strategy using virtual reality and assessment of postural reactions to dynamic visual stimuli in glaucoma patients performed better than SAP in predicting fall risk (Figure 2).³³ Balance control was evaluated using a force platform, and the postural reactivity to dynamic visual information was assessed using an immersive virtual environment with head-mounted goggles (Oculus Rift; Oculus). The postural reactivity metrics showed a significant association with self-reported history of falls in the 1-year period before the testing was conducted.³³

CONCLUSION

Glaucomatous visual field loss can significantly affect many daily activities. Determining how the disease leads to disability is paramount to effective management with better allocation of resources. Continued research on this topic is needed to develop guidelines to increase patients' safety and to evaluate potential assistive and rehabilitative strategies. ■

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