Criteria for Visual Field Progression

Insights from the Collaborative Normal-Tension Glaucoma Study and the Early Manifest Glaucoma Study.

BY DONALD BUDENZ, MD, MPH

Ophthalmologists see patients with established glaucoma every 3 to 6 months to ensure that their IOP is within the targeted range and to assess the stability of the disease. The importance of monitoring progression cannot be overemphasized, because the decisions based on it can be profound. Progressive disease usually necessitates escalating therapy, which may require aggressive treatment such as laser or surgical treatment.

In current, accepted practice, physicians base their assessment of glaucomatous progression on visualizations of the optic nerve and/or visual field testing. The AAO has not endorsed the use of newer imaging technologies for the following of glaucomatous progression, and physicians do not commonly use them. I suspect that most clinicians largely determine disease progression through their interpretation of the gray-tone printout or pattern deviation plot on visual field tests. These subjective methods are less accurate than judgments based on the criteria tested and found to be sensitive and specific within certain probability levels by large clinical trials.

This article describes the criteria from the Collaborative Normal-Tension Glaucoma Study (CNTGS) and the Early Manifest Glaucoma Trial (EMGT) upon which physicians may reliably base their decisions for further treatment.

THE CNTGS

In the CNTGS, investigators developed excellent criteria for the monitoring of glaucomatous visual field progression.[1,2] Relying solely on visual field analyses to define the endpoint for glaucomatous progression, researchers sought to determine whether lowering IOP in patients with normal-tension glaucoma slowed or prevented progression of the disease. Partway through the study, the investigators checked the progression rate and determined that at least two additional confirmatory fields were necessary to avoid a false-positive determination of progression.

The CNTGS' investigators determined progression using the threshold numbers in full-threshold Humphrey Visual Fields. If two or more points within or adjacent to an existing scotoma worsened by at least 10 dB or three times the average of the short-term fluctuations, whichever was larger, that field was thought to have progressed after confirmation on two subsequent fields. These numbers, however, may not apply to Swedish Interactive Threshold Algorithm (SITA) visual fields for two reasons. First, the short-term fluctuation is not measured in the SITA program. Second, a 10-dB change in full threshold may not be equivalent to a 10-dB change in a SITA field.

In clinical practice, the importance of this finding is that a large proportion of the results from a single visual field test will yield a false positive. The CNTGS suggested that one confirmatory test is not sufficient. False positives will still exist, even when relying on two fields. Therefore, clinicians should obtain a second, or even a third, confirmatory visual field test before deciding that a patient's disease has progressed and altering their management strategy.

THE EMGT

In the EMGT, patients with early "high-pressure glaucoma" were randomized to receive treatment or not.[3] The investigators used visual field testing and flicker chronoscopy, which is a photographic way to examine the optic nerve for progression. Virtually all of the study's patients showed progression in their visual fields before changes occurred in their optic nerves.

As opposed to the relatively arbitrary criteria developed by investigators in the CNTGS and outlined previously, researchers for the EMGT tested subjects four times in 2 months to determine the amount of noise in a visual field test. Once the investigators established the amount of noise, they were able to separate noise from true progression up to a certain statistical probability. The Glaucoma Progression Analysis software (Carl Zeiss Meditec Inc., Dublin, CA) incorporates the EMGT's statistical method for identifying glaucomatous progression. For the indication of *likely pro-*

gression, the Glaucoma Progression Analysis software requires that three consecutive visual field tests contain three or more identical points that have changed at a statistically significant level.

CAVEATS

One should not assume that all visual field progression is due to glaucoma. Patients with glaucoma are generally elderly and either have or can develop other diseases. The practitioner should rule out other causes of a worsening visual field such as vascular occlusive disease, age-related macular degeneration, nonglaucomatous optic neuropathies, and even central nervous system lesions or strokes. Before changing a patient's management, one should obtain at least two, preferably three, confirmatory visual fields—a potentially challenging clinical practice. Without these confirmatory visual fields, physicians may diagnose progression when there is not any. The investigators from the CNTGS and EMGT agree that confirming progression with more than one follow-up field is critical.

THE FUTURE OF DETECTION

Most research shows that changes in the optic nerve and retinal nerve fiber layer are detectable earlier than the changes in visual fields, at least with white-on-white perimetry. By following visual fields only, the clinician may miss early progression. Ideally, practitioners should obtain baseline stereo optic disc photographs and compare new stereophotographs of the optic disc to them on an annual basis. Perhaps a more economically feasible compromise would be to obtain baseline stereophotographs of the optic disc and use them as a basis for comparison during an annual funduscopic examination.

Diagnosing glaucomatous progression can be difficult, especially using visual fields, which tend to vary over time. The Glaucoma Progression Analysis software can help physicians decide whether visual fields have progressed. It should always be used in clinical context, however. ❑

Donald Budenz, MD, MPH, is Associate Professor, Department of Ophthalmology, Bascom Palmer Eye Institute, University of Miami School of Medicine. Dr. Budenz has received honoraria, and his institution has received research support from Carl Zeiss Meditec Inc. He acknowledged no financial interest in the product mentioned herein, however. Dr. Budenz may be reached at (305) 326-6000; dbudenz@med.miami.edu.

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