

Risk Factors in Glaucomatous Progression

IOP remains the only modifiable risk factor, but fixed, historic risk factors may help clinicians set the initial target pressure and the length of follow-up intervals.

BY TA CHEN PETER CHANG, MD, AND ELIZABETH A. HODAPP, MD

The definition of *glaucoma* no longer includes IOP, and physicians have long recognized that factors other than pressure play a role in an individual's susceptibility to glaucomatous optic neuropathy. IOP, however, remains central to the diagnosis and management of the disease. The higher the pressure is, the more likely a patient is to develop glaucoma, and the higher the likelihood is that glaucoma will worsen. The goal of management is to slow disease progression sufficiently to preserve lifelong vision while incurring as few side effects at the lowest costs possible.

To minimize the negative effects of treatment, clinicians rarely attempt to lower IOP maximally in newly diagnosed patients. Rather, physicians determine a target pressure below which progression is deemed unlikely, treat the patient to achieve this pressure, monitor disease progression, and adjust the target pressure and treatment if indicated. In other words, for each patient, doctors answer the following three questions:

1. How low a pressure do I want for this patient?
2. How much treatment will I recommend to attempt to get to this target?
3. How often will I examine the patient, and which tests will I perform on follow-up?

Assessing the likelihood of disease progression is useful for answering these questions.

NONMODIFIABLE RISK FACTORS

Several multicenter randomized clinical trials have identified IOP-independent risk factors for glaucomatous progression. They include older age, a large cup-to-disc ratio, beta-zone peripapillary atrophy,

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decreased corneal hysteresis, and pseudoexfoliation syndrome.¹⁻⁶ A thin central cornea is a risk factor for conversion to glaucoma in patients with ocular hypertension, but the relationship of central corneal thickness to glaucomatous progression remains uncertain.^{7,8} These risk factors cannot be modified and do not disappear. An additional impermanent risk factor, disc hemorrhage, is often—but not always—associated with glaucomatous progression.^{9,10}

When setting an initial target pressure and follow-up schedule, risk factors should be considered in addition to baseline IOP and disease severity. There is no formula with which to calculate the risk of glaucomatous progression from a set of initial findings, but the presence of multiple risk factors probably confers a higher likelihood of progression at any given IOP. It is therefore reasonable either to set a lower target pressure or to examine the patient more frequently when he or she exhibits multiple risk factors at diagnosis.

Because patients are monitored to ensure that IOP control is adequate and to detect evidence of disease progression, clinicians should regularly examine the optic nerve for the appearance of a disc hemorrhage.

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In most instances, this finding prompts the physician to shorten follow-up intervals and to increase the frequency of structural and/or functional tests. In a patient whose disease is so advanced that even minor visual field progression may severely affect visual function, the appearance of a disc hemorrhage may warrant more aggressive treatment.

MODIFIABLE RISK FACTORS

Mean IOP is the only well-established, modifiable risk factor for glaucomatous progression, and multiple randomized clinical trials have demonstrated that lowering IOP slows visual field deterioration in glaucoma patients. IOP fluctuation and lower ocular perfusion pressure have been shown to be associated with glaucomatous progression, but the evidence is less robust than for mean IOP.^{1,11-18}

Although IOP is easy to measure, and although most patients can achieve a target pressure, IOP measurements in the clinic represent a small nonrandom sampling of a patient's overall status. Nonadherence to therapeutics increases the risk of disease progression, presumably because of mean IOP elevation.^{19,20} Poor adherence to prescribed medical therapy is thus a risk factor for glaucomatous progression. In a tertiary center survey, approximately 27% of patients self-reported poor therapeutic adherence; they cited forgetfulness, decreased self-efficacy, difficulty with the medication schedule, and problems instilling drops as the main barriers.²¹

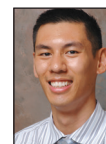
Laser trabeculoplasty, if appropriate for a patient's condition, may remove the issue of adherence. For patients requiring medical therapy, careful education and simplification of the regimen, including the use of fixed-dose combinations, may improve their adherence and reduce their risk of disease progression. Automated telecommunication-based reminder systems may also improve therapeutic adherence.²² Efforts to decrease IOP fluctuation and increase ocular perfusion pressure may be warranted if advanced disease is clearly progressing despite a well-controlled mean IOP.

CONCLUSION

In glaucoma management, the nonmodifiable risk factors help clinicians to determine the initial target pressure and the interval between follow-up visits. A disc hemorrhage often prompts an adjustment to the target pressure and interval between visits. IOP, which depends on adherence to medical therapy, remains the only modifiable risk factor for glaucomatous progression. ■

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