

Letters

GLAUCOMA SCREENINGS

The following reader-author exchange regards the article "Is Glaucoma Screening Worthwhile?" by Renata Picciani, MD; Richard K. Lee, MD, PhD; and Jeffrey D. Henderer, MD. The article appeared in our early spring 2011 edition.

A few years ago, there was a very interesting study from the United Kingdom titled "Inter-clinician variance in glaucoma diagnostic decisions" by Lisa Collins and Adrian R. Hill.¹ In this study, 36 patients were selected, of whom 32 participants were referred from optometrists as glaucoma suspects and four participants were known normal. Each participant was examined in a 4-hour session by five experienced glaucoma specialists from different hospitals in the United Kingdom. There was a wide variance in the diagnostic decisions among these experienced glaucoma specialists. Another interesting finding from this study was that, the more diagnostic parameters (eg, IOP, cup-to-disc ratio) used by these glaucoma specialists to diagnose glaucoma, the greater the variance in their diagnostic decisions. In view of these findings, how would one expect a general ophthalmologist (like myself) to do any better?

In my opinion, the reason for wide discrepancies in diagnostic decisions is that we do not fully understand what is happening to the optic disc in glaucoma. We do not have any established parameter to diagnose preperimetric glaucoma (as this is the most vital point for screening). We used to have a parameter of raised IOP to make a glaucoma diagnosis, but the IOP parameter is becoming obsolete, as the incidence of normal-tension glaucoma (≤ 21 mm Hg) in studies has ranged from 3.6% to 61%, depending on the analyzed population.² The cup-to-disc ratio parameter is also fading because of the great variance of the physiological cups among the general population. Additionally, the visual field parameter cannot pick up preperimetric glaucoma, since about 40% of the nerve fibers have to be destroyed before visual deficits are manifested,³ which would land us in the intermediate stage of glaucoma.

Although the newly discovered parameter for early glaucoma—thinning of the retinal nerve fiber layer (RNFL)—appears promising, it has its pitfalls. First, we do not know how much of the RNFL must be thinned prior to the diagnosis of glaucoma. Perhaps by that time, the pathological changes in the disc or field defects may start

appearing as well. Second, we cannot explain the cause of thinning of the RNFL occurring only in glaucomatous discs and not in other kinds of optic disc disease. It is difficult to utilize a parameter unless we understand the reason for doing it. Unless we find the true cause of thinning of the RNFL, we are left lost in a plethora of parameters and still have no true diagnostic yardstick for preperimetric glaucoma. Until that time, the screening projects may not be worthwhile.

SYED S. HASNAIN, MD
Porterville, California

1. Collins L, Hill AR. Inter-clinician variance in glaucoma diagnostic decisions. Poster presented at: 1st World Congress on Controversies in Ophthalmology; March 2010; Prague, Czech Republic.

2. Preferred Practice Pattern: Primary Open-Angle Glaucoma. San Francisco, CA: American Academy of Ophthalmology; 2005.

3. Quigley HA, Addicks EM, Green WR. Optic nerve damage in human glaucoma. III. Quantitative correlations of nerve fiber loss and visual field defect in glaucoma, ischemic neuropathy, papilledema, and toxic neuropathy. *Arch Ophthalmol*. 1982;100(1):135-146.

Dr. Henderer responds.

Dr. Hasnain brings up important points that are all too familiar to glaucoma specialists. Consensus is lacking with regard to what constitutes glaucomatous changes—at least very early changes. One would hope that the agreement between specialists would be much greater in the British study if the patients actually had glaucomatous disc and field damage (although I am unaware if visual field testing was part of the cited study). In the Ocular Hypertension Treatment Study (OHTS), about 170 patients converted from ocular hypertension to primary open-angle glaucoma by optic nerve head change, by visual field change, or by the combination of visual field change and optic nerve head change in roughly a 2:1:1 ratio.¹ These results suggest that, in the earliest stage of glaucoma, both the field and disc need to be examined and there might be different mechanisms at work, as patients convert from ocular hypertension to disease. In short, our understanding of the pathophysiology of glaucoma is incomplete.

Currently, a diagnosis of glaucoma is typically based on assembling a set of information, such as characteristic optic nerve changes with corresponding field defects and risk factors for glaucoma such as IOP, family history, and central corneal thickness, for example. Glaucoma suspects, essentially by definition, do not have all those elements, but even if they do, it is possible to be misled. It is possible some patients who are treated will never progress, because they suffered a single insult that is no

longer progressive, and it is possible that someone who may indeed develop glaucoma will go unrecognized and thus not be treated until his or her vision is affected.

Personally, I prefer to be honest with patients about the limits of my knowledge. I often explain to patients who are glaucoma suspects that I cannot tell if they have glaucoma but that, luckily, this disease is—depending on IOP and other risk factors like pigment dispersion, pseudoexfoliation, central corneal thickness, and family history—often a slowly progressive optic neuropathy and I should be able to detect change in the nerve and field that would confirm the diagnosis before they develop visually significant changes that affect their quality of life.

So, what to do about screening? Ideally, we would screen for glaucoma with a cheek swab for DNA and ganglion cell counter that measures exactly how many retinal ganglion cells are present. The swab would reveal the genotype, which I could compare to a set of natural history studies to see if such patients develop glaucoma, and counting the ganglion cells—or the rate of apoptosis of those cells—would help me identify loss that exceeds age-matched controls. But, that ability is in the future.

The current state of affairs, as Dr. Hasnain mentions, is far from perfect. In fact, in my mind, it is so difficult to differentiate very early glaucoma from normal that it may be impractical to screen for this stage of disease. Rather, I believe, given our current abilities, it makes more sense to screen for disease that will affect patients

within their lifetime. This may mean definitive moderate disease for many older patients and may mean advanced disease in the very elderly. The concept is to prevent too many false positives that consume resources and are one reason that screenings often are not cost-effective. In the young, however, who have many years ahead of them and in whom vision loss could be very problematic, erring on the side of being conservative by referring patients who are suspicious but not definitive for glaucoma at least provides for a baseline examination to use for future comparison. This includes screening patients with a family history of glaucoma, for example, to gauge the likelihood of developing glaucoma and screening patients at higher risk.

Screening is complicated in very early disease but not in moderate or advanced disease. But, as Dr. Hasnain points out, assessing glaucoma suspects in the office is often problematic. At this point, I would recommend that we not routinely seek to identify preperimetric or predisc-damage glaucoma on screening examinations. It just is not practical or perhaps even possible reliably with current technology in a community environment. The goal of glaucoma screening should be simplified to find people who are unaware of their disease and prevent them from losing more vision. That would be a substantial improvement over where we are now. □

1. Keltner JL, Johnson CA, Anderson DR, et al. The association between glaucomatous visual fields and optic nerve head features in the Ocular Hypertension Treatment Study. *Ophthalmology*. 2006;113:1603–1612.