Screening for Glaucoma: Recommendation Statement

U.S. Preventive Services Task Force

Summary of Recommendation

The U.S. Preventive Services Task Force (USPSTF) found insufficient evidence to recommend for or against screening adults for glaucoma. **I recommendation.**

The USPSTF found good evidence that screening can detect increased intraocular pressure (IOP) and early primary open-angle glaucoma (POAG) in adults. The USPSTF also found good evidence that early treatment of adults with increased IOP detected by screening reduces the number of persons who develop small, visual field defects, and that early treatment of those with early, asymptomatic POAG decreases the number of those whose visual field defects progress. The evidence, however, is insufficient to determine the extent to which screening—leading to the earlier detection and treatment of people with IOP or POAG—would reduce impairment in vision-related function or quality of life.

The USPSTF found good evidence that treatment of increased IOP and early POAG result in a number of harms, including local eye irritation and an increased risk for cataracts.

Given the uncertainty of the magnitude of benefit from early treatment and the known harms of screening and early treatment, the USPSTF could not determine the balance between the benefits and harms of screening for glaucoma.

Clinical Considerations

- POAG is a chronic condition characterized by a loss of retinal ganglion cell axons. It is manifested initially by peripheral visual field loss; in an uncertain number of cases, it progresses to impairment in important vision-related function and even to irreversible blindness.

- The diagnosis of POAG is not made on the basis of a single test but on the finding of characteristic degenerative changes in the optic disc and defects in visual fields. Although increased IOP has previously been considered an important part in the definition of this condition, it is now known that many people with POAG

do not have increased IOP; hence, there is little value of using tonometry to screen for POAG.

- Increased IOP, family history, older age, and being of African American descent place an individual at increased risk for glaucoma. Older African Americans have a higher prevalence of glaucoma and perhaps a more rapid disease progression, and if it is shown that screening for glaucoma reduces the development of visual impairment, African Americans would likely have greater absolute benefit than whites. People with a limited life expectancy would likely have little to gain from glaucoma screening.

- The natural history of glaucoma is heterogeneous and not well defined. There is a subgroup of people with POAG in whom there is either no disease progression, or the progression is so slow that the condition would never have an important effect on their vision. The size of this subgroup is uncertain and may depend on the ethnicity and age of the population. Others experience more rapidly progressing disease, leading to reduced vision-related function within 10 years. Whether an individual's glaucoma will progress cannot be predicted with precision, but those with higher levels of IOP and worse visual fields at baseline, and those who are older, tend to be at greater risk for the more rapid progression of glaucoma. Whether the rate of progression of visual field defects remains uniform throughout the course of glaucoma is unknown.

- Measurement of visual fields can be difficult. The reliability of a single visual field measurement may be low; several consistent visual field measurements are needed to establish the presence of defects. Dilated opthalmoscopy or slit lamp exam are used by specialists to examine changes in the optic disc; however, even experts vary in their ability to detect glaucomatous optic disc progression. Additionally, there is no agreed-upon single standard to define and measure progression of visual field defects.

- The primary treatments for POAG reduce IOP; these include medications, laser therapy, or surgery. These treatments effectively reduce the development and progression of small, visual field defects. The magnitude of their effectiveness, however, in reducing impairment in vision-related function is uncertain. Harms caused by these interventions include formation of cataracts, harms resulting from cataract surgery, and harms of topical medication.

Discussion

Primary open-angle glaucoma is the most prevalent type of glaucoma in the U.S. population. Based on estimates for the year 2000, 2.5 million people in the U.S. have POAG; of those, 130,000 will be blind as a result of the disease.[4] Half of those with POAG may not be aware that they have the disease.[5,6]

The primary risk factor for developing POAG is increased intraocular pressure (IOP) above 21 mm Hg; however, 25% to 50% of those with glaucoma have normal IOP measurements.[5,7,8] African Americans have a 4-fold higher incidence and prevalence of POAG than whites.[9] Other important risk factors for developing POAG are age and family history of glaucoma.[9,10] Additional risk factors may include decreased central cornea thickness, low diastolic perfusion pressures, diabetes, and severe myopia.[11]

Increased IOP is a principal risk factor for glaucoma, but the utility of tonometry as a screening tool for POAG is limited. IOP fluctuates over time and diurnally; more than 1 reading may be needed to detect elevated IOP. In 1 population-based survey, increased IOP was found to have a sensitivity of 47% and a specificity of 92% for diagnosing glaucoma.[2,3] A diagnosis of POAG is made upon finding characteristic degenerative changes in the optic disc, along with a loss of visual field sensitivity. Perimetry assesses visual field loss by mapping a patient's response to visual stimuli presented in various locations within the visual field. Perimetry may be performed by manual or automated methods. The sensitivity and specificity of perimetry varies based on the method used, the cut-off point for defining visual field defects, and the test that is used as a gold standard.[2,3] The Henson Visual Field Analyzer and the frequency-doubling perimetry are new methods that need further testing before they are ready for general use. Direct ophthalmoscopy of the dilated eye or slit lamp examination are used by specialists; direct ophthalmoscopy has a reported sensitivity of 59% and a specificity of 73% in detecting and classifying optic disc changes associated with glaucoma.[2,3] Even among experts, however, there is wide variability in both interobserver and intraobserver reliability in detecting glaucomatous optic disc progression.[2,3]

The USPSTF found randomized controlled trials (RCTs) with untreated control groups that provided evidence about the effect of early treatment in persons with either increased IOP or of early POAG on intermediate outcomes.[12-14]

In the Ocular Hypertension Treatment Study, a good-quality trial, topical medications were compared with no treatment in individuals with increased intraocular pressure and no manifestation of POAG, 25% of whom were African American.[12] After 5 years, the cumulative probability of developing POAG (measured as the development of reproducible—but asymptomatic—visual field abnormality or optic disc deterioration) was 4.4% in the medication group and 9.5% in the observation group; the number needed to treat (NNT) was 19.6.

The Early Manifest Glaucoma Trial, a good-quality trial, compared progression of visual field defects in people with screen-detected early glaucoma randomized to either treatment by argon laser trabeculoplasty (ALT) and topical beta-blocker eye drops or to no treatment.[13] The participants were predominantly white with both normal and high IOP. After a median follow-up of 6 years, progression of visual field defects was 45% in the treatment group compared with 62% in the no-treatment group. After 4 years, 30% of treated subjects had progressed, compared with 49% of untreated subjects; NNT = 5.3. Progression was not defined by the development of visual or functional impairment. Effects of the treatment on vision-related quality of life have not been reported.

In the Collaborative Normal-Tension Glaucoma Study (CNTGS), a fair-quality trial, individuals with manifestations of POAG, but without elevated IOP, were randomized to receive either treatment with medications or surgery to lower IOP by 30%, or to receive no treatment.[14] The study found that IOP plays a role in the pathogenesis of normal-tension glaucoma, and that lowering IOP may be beneficial. At the end of 5 years, the study found no statistically significant difference between the treated and untreated groups in either the worsening of existing visual field defects or the appearance of new defects. A secondary analysis of CNGTS concluded that there was a reduction in glaucoma progression in the treated group. However, this analysis censored those who developed cataracts, and since more cataracts developed in the treated group, it may have introduced a bias favoring treatment.[2,3]

The different methods used to define visual field progression in different clinical trials of glaucoma correlate poorly with one another and are sensitive to small changes in visual field defects.[2,3,15] The clinical implication of small differences in visual field measurement between treated and untreated participants in terms of functional visual impairment is unclear. Whether small reductions in visual field progression would translate over time into important reductions in vision-related function for a substantial number of people, is also uncertain. For these reasons, the USPSTF could not determine the magnitude of benefits of screening adults for glaucoma.

Potential harms of screening include eye irritation and dysgeusia associated with topical anesthetics, corneal abrasions and infections from instruments that touch the eye, apprehensiveness about the exam, and the psychological effects of labeling. Harms of medical treatment include ocular dryness, tearing, and itching; however, studies indicated no significant increase in the incidence of serious systemic harms,[13] worsening of preexisting conditions, or an increase in the total number of hospitalizations or mortality.[12] Surgical trabeculectomy is associated with intraoperative complications, such as bleeding in the anterior chamber (7%) and conjunctival buttonhole defects (1%), as well as with postoperative complications.[16] The long-term implications of these complications were not reported. Surgical treatment increases the risk for cataract development and extraction rate compared with medical treatment (12% vs 3%).[12,13,16]

Results from recent RCTs have led to substantial progress in the understanding of early POAG and the potential of screening for reducing the impaired vision-related function caused by POAG. However, the remaining gaps in knowledge are serious enough to prevent a general recommendation for screening. It is essential that the research on glaucoma screening receive adequate funding and attention to fill these gaps.

Although it is difficult to study, the natural history of untreated early POAG needs to be better understood. Validated criteria are needed to define progression in visual field defects, and how this progression correlates with visual impairment and quality of life. The impact of small changes in the visual field on vision-related function needs to be clarified. The relationship between increased IOP and POAG needs to be better defined. Another important gap is the lack of adequate knowledge of operating characteristics of

the various screening tests, especially for those tests that are feasible in primary care practice.

Research into approaches of reducing the harms of early treatment is also important. Adding visual field testing to studies like the National Health and Nutrition Epidemiologic Survey (NHANES) would potentially assist in gathering important information on the prevalence and severity of undetected and untreated glaucoma.

Recommendations of Other Groups

The American Academy of Ophthalmology recommends screening for glaucoma as part of the comprehensive adult medical eye evaluation, starting at the age of 20, with a frequency depending on an individual's age and other risk factors for glaucoma: (http://www.aao.org/education/library/ppp/loader.cfm?url=/commonspot/security/getfile.cfm&PageID=1275).

Primary care providers can perform the screening by measuring the intraocular pressure and evaluating the optic nerve if they have the appropriate skills and equipment. The Department of Veterans Affairs recommends that every veteran over the age of 40 be screened for glaucoma in a primary care setting with a frequency depending on his or her age, ethnicity, and family history: (http://www.oqp.med.va.gov/cpg/glaucoma/G/Glaucoma12_cpg.doc).

The American Optometric Association recommends annual eye examinations for people at risk for glaucoma; these recommendations can be accessed at: http://www.aoanet.org/conditions/glaucoma.asp.

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†Steven M. Teutsch, MD, MPH recused himself from voting on this topic.

This statement summarizes the USPSTF recommendation on screening for glaucoma and the supporting scientific evidence, and updates the 1996 recommendations contained in the *Guide to Clinical Preventive Services*, second edition.[1] Explanations of the ratings and of the strength of overall evidence are given in Appendix A and Appendix B, respectively. The complete information on which this statement is based, including evidence tables and references, is included in the update for the USPSTF,[2] and in the evidence synthesis[3] on this topic, available through the USPSTF Web site (www.preventiveservices.ahrq.gov). The recommendation is also posted on the Web site of the National Guideline Clearinghouse™ (www.guideline.gov).

Recommendations made by the USPSTF are independent of the U.S. Government. They should not be construed as an official position of AHRQ or the U.S. Department of Health and Human Services.

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Appendix A

U.S. Preventive Services Task Force Recommendations and Ratings

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The Task Force grades its recommendations according to one of 5 classifications (A, B, C, D, I) reflecting the strength of evidence and magnitude of net benefit (benefits minus harms):

A. The USPSTF strongly recommends that clinicians provide [the service] to eligible patients. *The USPSTF found good evidence that [the service] improves important health outcomes and concludes that benefits substantially outweigh harms.*

B. The USPSTF recommends that clinicians provide [the service] to eligible patients. *The USPSTF found at least fair evidence that [the service] improves important health outcomes and concludes that benefits outweigh harms.*

C. The USPSTF makes no recommendation for or against routine provision of [the service]. *The USPSTF found at least fair evidence that [the service] can improve health outcomes but concludes that the balance of benefits and harms is too close to justify a general recommendation.*

D. The USPSTF recommends against routinely providing [the service] to asymptomatic patients. *The USPSTF found at least fair evidence that [the service] is ineffective or that harms outweigh benefits.*

I. The USPSTF concludes that the evidence is insufficient to recommend for or against routinely providing [the service]. *Evidence that [the service] is effective is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.*

Appendix B

U.S. Preventive Services Task Force Strength of Overall Evidence

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The USPSTF grades the quality of the overall evidence for a service on a 3-point scale (good, fair, poor):

Good: Evidence includes consistent results from well-designed, well-conducted studies in representative populations that directly assess effects on health outcomes.

Fair: Evidence is sufficient to determine effects on health outcomes, but the strength of the evidence is limited by the number, quality, or consistency of the individual studies, generalizability to routine practice, or indirect nature of the evidence on health outcomes.

Poor: Evidence is insufficient to assess the effects on health outcomes because of limited number or power of studies, important flaws in their design or conduct, gaps in the chain of evidence, or lack of information on important health outcomes.

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