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Risk Assessment for Glaucoma

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Abstract: Glaucoma is undergoing a paradigm shift and transitioning from merely disease staging to evidence-based risk assessment of in the individual patient.

Initially introduced for ocular hypertensive patients, risk assessment calculators are now being developed for patients with established glaucoma.

All persons at risk will not develop glaucoma, and some persons do so even without identifiable risk. These tenets are at the core of the conceptualization of risk assessment for glaucoma. By refining the predictive value of end of the various risk factors, this concept can evolve [1, 2].

LESSONS FROM CARDIOVASCULAR MEDICINE

Population-based, prospective, epidemiologic research provides valuable insights into the prevalence, incidence, predisposing conditions, prognosis and clinical continuum of disease. Based on pathologic observations and metabolic investigation, dyslipidemia was recognized as a fundamental risk for accelerated atherogenesis. Moreover, other measurable and correctable predisposing conditions, such as hypertension and diabetes, also were demonstrated to be risk factors. Clinical trials showed modification of some of these predisposing risk factors substantially reduced the risk of coronary heart disease (CHD). Aggregation of this evidence has provided the foundation for the development of guidelines on the prevention, recognition, and management of risk factors for CHD. It also stimulated the development of risk calculators [2-5].

Based on a considerable body of work, Framingham Study-based multivariable risk assessment calculators now are widely used to estimate the 10-year probability of a coronary event for dyslipidemia. Such calculators depend on the level of blood lipids and the burden of coexisting risk factors, including age, systolic blood pressure, hypertension treatment, and cigarette smoking. These risk calculators promote cost-effective targeting of CHD candidates for controlling blood lipids. They also provide for more cost-effective therapy, as treatment is directed to the patients for whom it is most appropriate.

STRATEGIES FOR GLAUCOMA RISK ASSESSMENT

Glaucoma is undergoing a paradigm shift and transitioning from merely disease staging to evidence-based risk assessment of the individual patient. Initially introduced for ocular hypertensive patients, risk assessment calculators [6] are now being developed for patients with established glaucoma [7-9].

A broad range of management options exists for patients with ocular hypertension. Ultimately, the patient and the ophthalmologist collaborate in determining if, or when, therapy will be initiated. Safety, efficacy, cost and convenience are all factors that impact the decision to treat. Evidence-based risk assessment aids in determining whether treatment is warranted in a particular patient. Although this evidence is limited, consideration of risk factors, disease progression risks, and life expectancy help to determine if treatment is appropriate. Glaucoma risk assessment should evolve toward greater refinement with the availability of new evidence, just as CHD risk assessment has evolved. New clinical trials, long-term follow-up of ongoing studies, and contributions from research into the pathogenesis and treatment of glaucoma all are needed to continue to refine this model.

LIMITATIONS OF GLAUCOMA RISK ASSESSMENT

Considerable data still are lacking to optimally achieve the development of definitive management guidelines for ocular hypertension. In contrast to CHD, in which the study endpoints clearly reflect an untoward impact on quality of life, the endpoints currently used for glaucoma studies are limited to progression based on visual field testing or observation of the optic nerve. Thus, it is critical to define the period between the development of glaucoma and progression to significant visual loss and blindness in longitudinal trials. Additionally, the effect of additional potential risk factors, such as diabetes mellitus, hypertension, and family history, requires further study. Also, because of the limited sample size, studies such as OHTS/EGPS have not been able to evaluate a number of risk factors. The limited power of these studies could have resulted in a risk factor being declared as non-significant when in fact it is. Methodological limitations also resulted in well-known risk factors, such as family history, not being incorporated into the calculator. Research also is needed to clarify the role of physiologic, environmental, and lifestyle factors.

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Point estimates of relative risk for evaluated risk factors are relatively imprecise, as indicated by relatively large confidence intervals. This indicates a need for studies with larger samples. Current calculators refer only to baseline values. They do not take into account follow-up history. Calculators have not been validated in blacks or Asians. Although the OHTS includes blacks, the EGPS did not. Only a limited proportion of OHT patients actually fit into the description of OHTS/EGPS.

With these data, one can refine the multivariate risk factor assessment. Then a number-needed-to-treat analysis, preferably based on progression to significant visual impairment rather than on progression to glaucoma alone, and eventually a cost-effective analysis could be produced.

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