
A Canadian glaucoma strategy

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ABSTRACT • RÉSUMÉ

Background: To develop Canadian guidelines for the management of primary open-angle glaucoma and provide a quick and practical reference for physicians in the office setting.

Methods: A *Canadian Glaucoma Strategy* began with a review of the literature and existing guidelines, as well as consultation with glaucoma specialists and general ophthalmologists across Canada. The resulting information was assessed by a panel of glaucoma experts and general ophthalmologists at the Canadian Glaucoma Strategy Forum to distill what was learned and construct the algorithms of care.

Results: A *Canadian Glaucoma Strategy* was developed in 4 algorithms. First, patients are diagnosed on the basis of risk assessment and clinical findings. The staging algorithm is designed to determine the disease stage, while the treatment and follow-up algorithms focus on control of intraocular pressure and continuing patient follow-up.

Interpretation: A *Canadian Glaucoma Strategy* is a practical series of algorithms that can be at hand in the office setting, providing the general ophthalmologist with an up-to-date guide for the management of patients with glaucoma concerns.

Contexte : Élaboration d'un guide canadien de gestion du glaucome primitif à angle ouvert et présentation d'un outil de référence pratique et facile à consulter pour l'ophtalmologiste généraliste au bureau.

Méthodes : Une *Stratégie canadienne de gestion du glaucome* fut initiée d'abord par une revue de la littérature et des guides existants ainsi que par une consultation auprès des spécialistes du glaucome et des ophtalmologistes généralistes du pays. L'information obtenue a été évaluée par une équipe de spécialistes du glaucome et d'ophtalmologistes généralistes réunis en forum afin d'en extraire les connaissances acquises et élaborer les algorithmes des soins.

Résultats : Une *Stratégie canadienne de gestion du glaucome* a été mise au point selon 4 algorithmes. D'abord, le diagnostic repose sur l'évaluation du risque et les constatations cliniques. L'algorithme de stadification permet d'établir le stade de la maladie, alors que les algorithmes du traitement et du suivi portent sur le contrôle de la pression intraoculaire et le suivi soutenu du patient.

Interprétation : Une *Stratégie canadienne de gestion du glaucome* comporte une série d'algorithmes pratiques et à portée de main, offrant à l'ophtalmologiste généraliste un guide à jour pour la gestion des patients atteints de glaucome.

Glaucoma is a group of complex diseases characterized by degeneration of retinal ganglion cells and progressive visual loss. It is one of the leading causes of blindness worldwide.¹ Primary open-angle glaucoma (POAG) is the most common form in the developed world, accounting for more than 90% of all glaucoma diagnoses in Canada.² For that reason, *A Canadian Glaucoma Strategy* focuses on POAG.

General principles

A diagnosis of glaucoma relies on a cluster of clinical findings, most notably changes in the optic disc, defects of the retinal nerve fibre layer, and loss of visual field. Currently, glaucoma treatment is based on pharmacological and surgical interventions to reduce intraocular pressure (IOP).³⁻⁶ Glaucoma management is complicated by a number of factors, however, in particular the evolving

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Originally received Feb. 13, 2006. Revised July 5, 2006
Accepted for publication Aug. 15, 2006

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This article has been peer-reviewed. Cet article a été évalué par les pairs.

Can J Ophthalmol 2007;42:60-5
doi:10.3129/can.j.ophthalmol.06-100

nature of the disease, which makes it necessary for physicians to periodically readjust their clinical approach as disease patterns and progression rates change over the patient's lifetime. Glaucoma management in Canada is further characterized by several other factors:

- lack of comprehensive Canadian guidelines
- a wide variety of treatment options
- the (often unmet) need for early referral
- uneven distribution of ophthalmologic services
- uneven availability of technology
- lack of reimbursement for key technologies
- multiple entry points for specialist referral, including optometrists and family physicians

For these reasons, a universal glaucoma management strategy that attempts to cover all possible clinical situations is likely to be unworkable and of limited use to clinicians in practice. Management strategies that are most useful for this complex, ever-changing disease are those that assist clinical judgment, not replace it, and are simple, brief, and applicable in real-life clinical situations.

Canadian clinical practice: current perspectives

Management of POAG in Canada currently relies on physician experience and on evidence-based literature. The results of key randomized clinical trials published over the past several years demonstrate that lowering IOP is an effective treatment for POAG at different stages of the disease spectrum^{7–11} and is associated with slower progression or arrest of the disease.

In addition, several valuable guidelines have been published worldwide to help physicians deliver glaucoma care, although the length and format of these documents limit their usefulness as bedside references.^{3–6} In Canada, one consensus publication, Canadian perspectives in glaucoma management: setting target intraocular pressure range, offers a logical approach to IOP reduction in relation to the severity of the disease and is frequently consulted by Canadian ophthalmologists.⁴ Nonetheless, there remains a need for more complete guidelines that encompass all aspects of glaucoma management and yet are concise, easy-to-use, and practical as a quick reference guide. *A Canadian Glaucoma Strategy* was designed to provide a practical clinical tool to Canadian ophthalmologists for improving the quality of glaucoma care.

Development of A Canadian Glaucoma Strategy

A Canadian Glaucoma Strategy was developed by a forum of Canadian glaucoma specialists and general ophthalmologists who initially met in November 2004 in Montreal. The strategy is based on clinical trial data and the recommendations of international guidelines devel-

oped by the American Academy of Ophthalmology,³ the European Glaucoma Society,⁵ the Japan Glaucoma Society,⁶ and Damji et al.⁴

After review of this literature, the panel followed a consensus model for development of practical algorithms to aid in the management of glaucoma suspects and glaucoma patients.

RESULTS

The strategy is presented as a series of algorithms for open-angle glaucoma (OAG) management in Canada and is designed to be

- evidence-based
- simple and easy to follow
- practical to apply
- easily adaptable into clinical management tools

The 4 algorithms developed (diagnosis, staging, treatment, and follow-up) are presented here in sequence.

1. Diagnosis

The diagnosis algorithm for *A Canadian Glaucoma Strategy* is shown in Fig. 1. This algorithm takes into consideration the factors involved in assessing a patient for whom there is a glaucoma concern.

As in most clinical situations, diagnosis of glaucoma is based on both a cluster of clinical findings gained through physical examination and a risk assessment of the likelihood of the patient having (or developing) the disease.

A Canadian Glaucoma Strategy does not include a formal model of risk assessment, which is left to the clinician's judgment. Risk assessment begins with a detailed medical history, including the reason for the referral and the chief complaint. Special attention should be paid to a history of pulmonary disease, drug allergies, migraine, cold hands, Raynaud's syndrome,¹² neurological diseases, and blood loss.⁵ Glaucoma, eye trauma, eye inflammation, and steroid use^{13–16} should be noted in the ocular history.⁵ Other OAG risk factors to take into account include the following factors:

- elevated IOP^{17–22}
- age^{18–21,23}
- thin central corneal thickness^{9,11}
- family history of glaucoma (in first degree relatives)^{18,19,23–25}
- African ancestry^{26–28}
- Severe myopia¹⁸
- cardiovascular risk factors^{18,28,29}
- eye trauma³⁰

Each patient requires a complete eye examination.

Clinicians should look for signs of glaucomatous damage such as nerve fibre layer defects,³¹ increased vertical cup-to-disc ratio (relative to disc size),^{9,11,19} peripapillary atrophy,³¹ presence of optic disc haemorrhage, and other signs of optic nerve atrophy. Because not all optic nerve atrophy is due to glaucoma, however, other sources of optic neuropathies should also be considered. Pseudoglaucomatous cupping due to a large physiologic cup, giant cell arteritis, ischemic optic neuropathy, and compressive lesions can mimic glaucomatous optic atrophy. Optic disc pit or coloboma, an ischemic event, and a tilted or myopic disc can also mimic glaucomatous damage. This nonglaucomatous disc damage, along with the myriad of often interrelated OAG risk factors, can make diagnosis difficult. Imaging of the optic nerve and nerve fibre layer with photography or other automated devices is appropriate,

as it may help in the diagnosis and is a promising technology to monitor progression.

After progressing through algorithm 1, the physician should have a working diagnosis: the patient either (1) does not have glaucoma (a normal eye or damage unrelated to glaucoma), (2) is a glaucoma suspect (in which case the physician should progress to algorithm 2A: staging), or (3) has glaucoma (requiring progression to algorithm 2B: staging). For glaucoma suspects, repeated visits over months or years may be necessary to establish a diagnosis and appropriate follow-up.

2. Staging

Once the physician has a working diagnosis, a disease stage is assigned. The two distinct staging algorithms are shown in Fig. 2A and 2B, outlining the procedures for glaucoma suspects and glaucoma patients, respectively.

After algorithm 2A, the physician performs risk evaluation on glaucoma suspects to determine whether treatment should be initiated (in which case they should progress to algorithm 3) or if more monitoring is appropriate.

Algorithm 2B guides physicians to categorize OAG eyes as being at an early, moderate, or advanced stage. The definitions of the disease state are based on the previously published Canadian guidelines.⁴ All patients then proceed to algorithm 3: treatment (Fig. 3).

3. Treatment

The treatment algorithm guides the physician through a treatment strategy that reflects real-life clinical experience. The central elements of algorithm 3 are the response to treatment (IOP) and a time-sensitive “anxiety filter” that encapsulates the physician’s concerns about a patient. This filter permits the ongoing reassessment of optimal patient response by considering factors such as disease stage, compliance, and life expectancy, as well as factors that directly impact the quality of the patient’s life such as side effects, medication costs, availability of health insurance, discomfort, and visual disability.

Once treatment is initiated, the patient either responds (+ve) or does not respond (–ve) adequately. The Ocular Hypertension Treatment Study (OHTS)¹¹ and the Collaborative Normal-Tension Glaucoma Study⁹ suggest that reductions of 20% or 30%, respectively, in baseline IOP can slow the progression of glaucomatous damage. Accordingly, these responses have been used as treatment goals in these as in other glaucoma management guidelines.^{3–6}

The treatment goal is to achieve and maintain target IOP. Target IOP has been defined as either the upper limit of a stable range of IOPs that are unlikely to cause further optic nerve damage³ or the mean IOP obtained with treat-

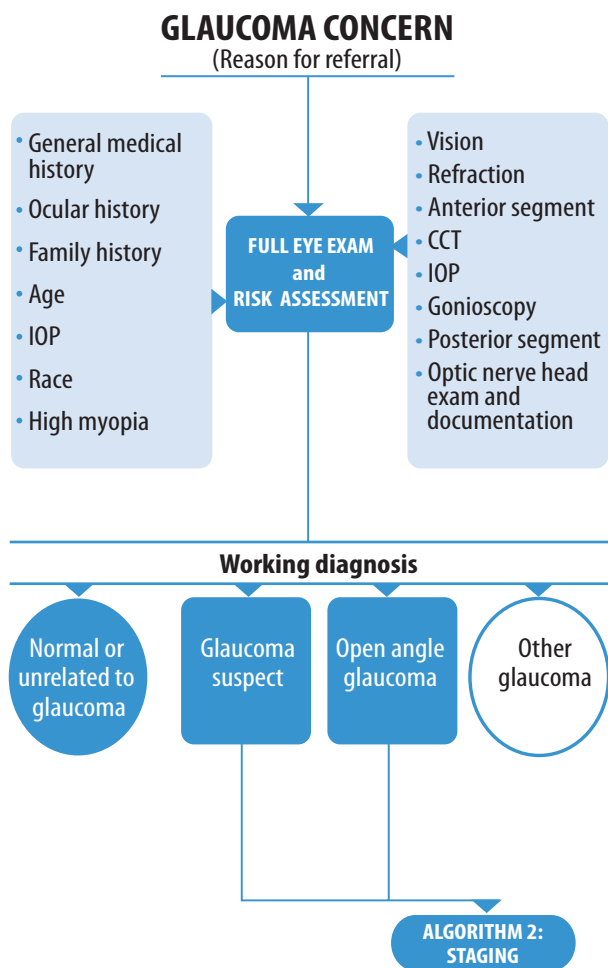


Fig. 1—Algorithm 1 outlines the necessary steps for diagnosis of a patient for whom there is reason to be concerned about the presence of glaucoma.

ment that prevents further glaucomatous damage.⁵ Target IOPs are unique for each patient (in fact, for each eye) and are based on several patient factors including disease stage and baseline IOP.⁴ There are several advantages to setting a target IOP or range.⁴ It provides a measurable therapeutic goal that is shared with the patient, thus involving the patient in his or her glaucoma management, it standardizes IOP control strategies among ophthalmologists, and it allows each eye to be treated separately. It should be noted that this algorithm is not intended to provide detailed recommendations for treatment itself. Rather, it provides a framework for decision-making when managing this multi-faceted, chronic disease.

4. Follow-up

Follow-up (Fig. 4) provides broad guidelines for patients with stable IOP and summarizes the underlying considerations in the long-term management of the glaucoma patient.

The right side of the lower half of the algorithm presents visit frequency when target pressures are met and sustained. Continuous reassessment is the hallmark of good glaucoma management. Patients with moderate or advanced disease need more attention, more resources, and more frequent observations. As noted in the upper half of Fig. 4, each reassessment should determine the efficacy and safety of treatment. If efficacy and safety are not satisfactory, the physician should return to algorithm 3 and a new target IOP or a medication change may be needed. If patient response is satisfactory, the follow-up schedule is continued.

The left side of the lower half of algorithm 4 presents target IOP. Clinical experience suggests that more aggressive IOP control is needed in more advanced disease states. The OHTS suggests that patients without detectable glaucomatous damage benefit from IOPs that are lower than 25 mm Hg.¹¹ For benefits in more advanced patients, the Advanced Glaucoma Intervention

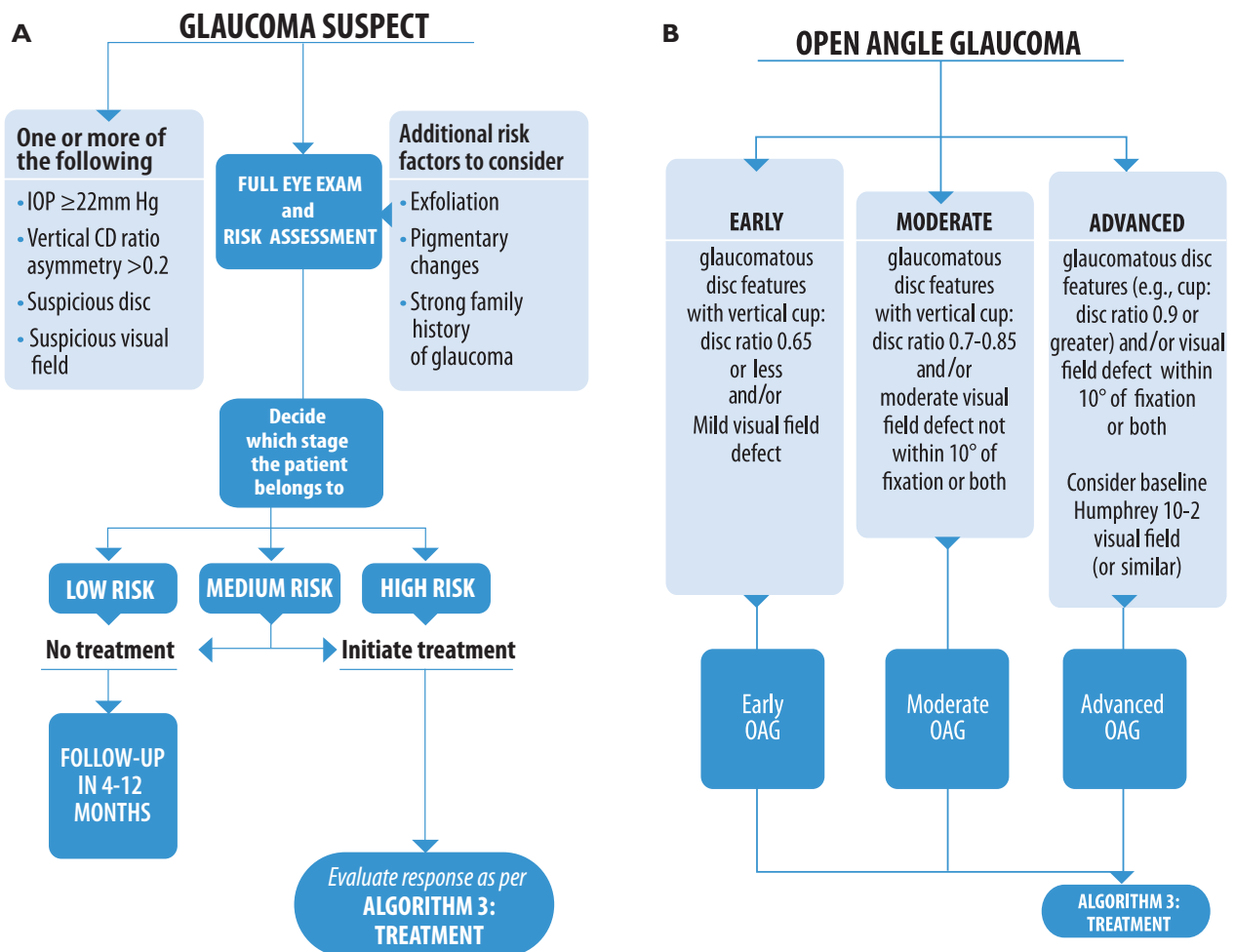


Fig. 2—These algorithms outline the process of staging for patients who are glaucoma suspects (2A) or have a diagnosis of glaucoma (2B).

Study suggests IOPs should be consistently lower than 18 mm Hg,⁷ while two other studies suggest IOPs lower than 15 mm Hg are appropriate for patients with severe glaucoma (near-total cupping with split fixation).^{32,33}

INTERPRETATION

A Canadian Glaucoma Strategy was created to provide a practical, everyday aid to glaucoma patient care. Several useful glaucoma management guidelines have been published that provide more comprehensive coverage of glaucoma and its treatment strategies³⁻⁶ and the strategy is not a substitute for these extensive references and other textbooks.

Progression through each algorithm in *A Canadian*

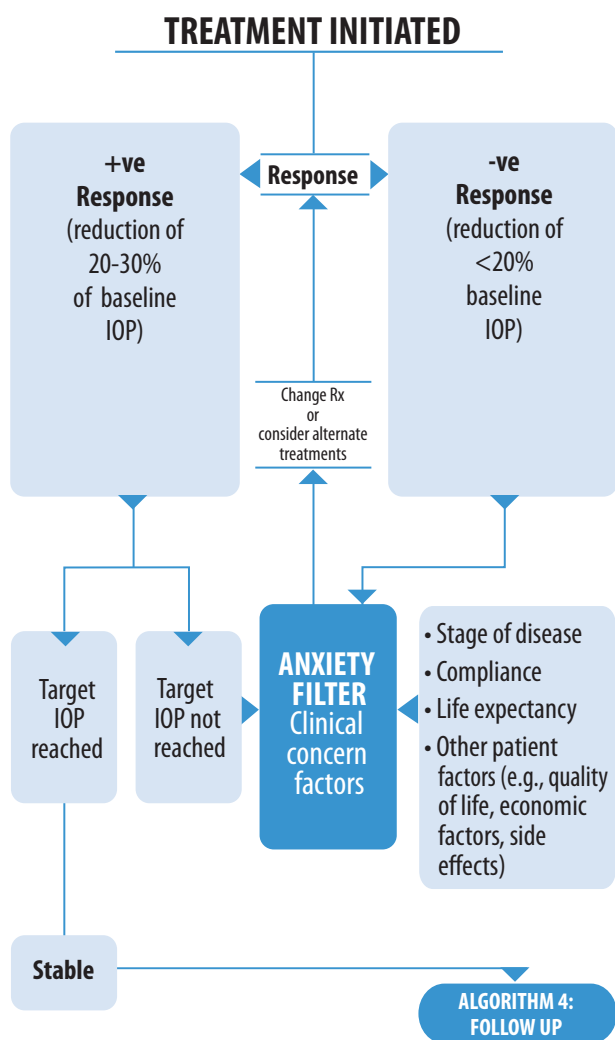


Fig. 3—Algorithm 3 outlines the rationale underpinning the treatment of glaucoma, based on patient’s response to treatment and the stability of the disease.

Glaucoma Strategy is based on appropriate patient classification. The challenge of glaucoma management is to properly classify the patient throughout the management process so that the appropriate cadence of care is followed. Meeting this challenge will improve the treatment outcome.

When support personnel are made aware of the patient’s disease state, and its implications for ongoing management, the whole team can work together more effectively to support and manage each patient. Sharing these algorithms with support staff in individual practices can improve the understanding of care priorities and thus the quality of care offered to the patient.

This initiative was supported by an unrestricted educational grant from Pfizer Canada Inc. Over the past two years, Dr. LeBlanc has acted as a lecturer for CPD programs sponsored by Pfizer, as well as participating as a member of both national and international advisory boards.

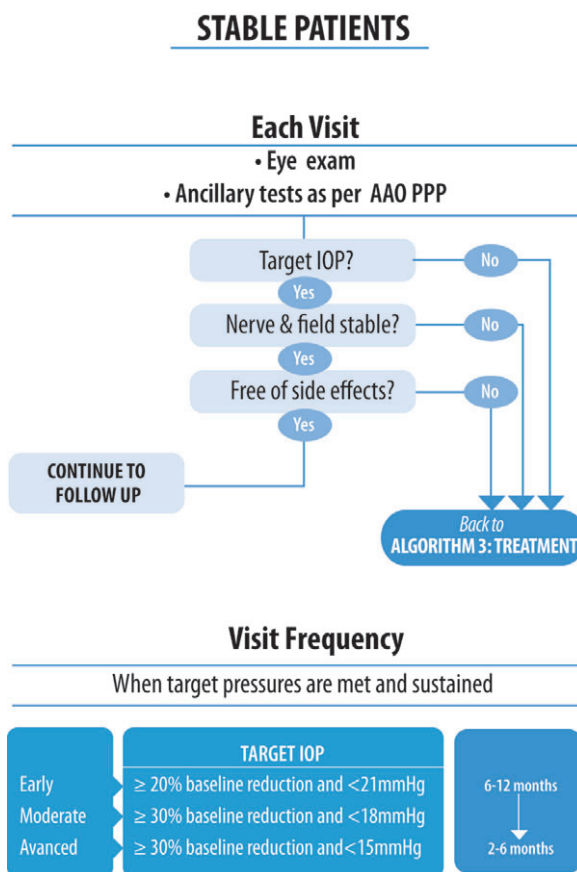


Fig. 4—Algorithm 4 outlines a strategy for the follow-up and monitoring of glaucoma patients.

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Key words: algorithm, diagnosis, staging, treatment, follow-up