Primary Stroke Prevention
Medical Therapy Versus Revascularization

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KEYWORDS

- Carotid artery disease • Asymptomatic carotid disease • Carotid stenosis
- Atherosclerotic vascular disease • Stroke prevention

KEY POINTS

- The finding of asymptomatic carotid artery stenosis should be considered an indicator of heightened cardiovascular risk, and an opportunity for intensified primary prevention.
- Patients should be evaluated broadly for all modifiable risk factors, and educated.
- All patients should be counseled with regard to lifestyle changes and therapeutic targets.
- Maximal medical therapy, including antiplatelet therapy where appropriate, statin therapy, and blood pressure–lowering therapy, should be used as recommended by current consensus guidelines.
- A subset of patients with asymptomatic carotid stenosis may benefit from preventive revascularization to reduce the risk of ipsilateral stroke.
- Careful patient selection is required when considering whether to revascularize as an adjunct to optimal medical therapy.

INTRODUCTION

Primary prevention of ischemic stroke relies on the identification of risk factors indicating that a given patient is at a heightened risk of a first event and subsequent modification of that risk.[1] It is important to recognize that events broadly characterized as ischemic stroke are in fact a heterogeneous group of events that include differing causes such cardioembolic events, artery-to-artery emboli, in situ thrombosis, and small-vessel ischemic changes. Primary preventive strategies must assess patient risk broadly to assess all contributors to risk.[1]

One risk indicator is the finding of a carotid artery stenosis, generally detected by auscultation of bruit on examination or by imaging.[1–4] Significant carotid stenosis is generally defined as more than 50% narrowing of the vessel lumen.[4,5] The most common cause of carotid artery stenosis is atherosclerotic vascular disease with lipid accumulation in the vessel wall and associated remodeling and calcification. Other potential causes include carotid dissection, fibromuscular dysplasia, and inflammation associated with vasculitides.[4] In general (and in this review), the term "carotid artery disease" refers

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to atherosclerosis of the carotid artery most often apparent at the carotid bulb, but also involving the common, internal, and external carotid arteries.

The question of optimal primary prevention for patients with carotid disease is important.[4] Overall, the prevalence of carotid artery disease is increasing in the setting of an aging population, and the majority of new strokes are ischemic strokes.[6] Ischemic stroke has been described as a highly morbid event that results in permanent disability and loss of independence in a significant proportion of those who survive.[6] A relationship has been described between degree of stenosis associated with carotid atherosclerosis and the subsequent risk of cardiovascular events and ischemic stroke.[5,7,8] This observation has led investigators to target those patients with more severe stenoses in trials of interventions targeted at revascularizing carotid disease and reducing the associated risk of stroke.[9–12] It is estimated that of patients who have carotid atherosclerosis, the estimated prevalence of severe stenoses of more than 60% is low in all adults, but may affect 2% of the Medicare population.[13,14]

It must be recognized, however, that the patient with carotid atherosclerosis suffers from a systemic process with adverse events beyond that attributable to the specific stenosis. In fact, a significant proportion of subsequent ischemic strokes in patients with unilateral carotid disease occur on the contralateral side.[10,12,15] In addition, it is important to recognize shifts in the epidemiology of ischemic stroke that have occurred against the background of an aging population and improving medical therapies, in that it is estimated that currently less than 15% of strokes are due to asymptomatic carotid disease, and that the annualized risk of stroke in patients with asymptomatic carotid disease is approximately 1% and likely decreasing.[14,16–18] Patients with stable carotid disease are at heightened risk for cardiovascular events broadly including other vascular territories, such as acute myocardial infarction (MI).[2–4] Therefore, optimal primary preventive strategies must evaluate the patient first as well as the carotid stenosis.

An important determinant of stroke risk related to carotid stenosis is the clinical status of the lesion and patient.[4] Symptomatic carotid disease, defined as the acute onset of a focal neurologic symptom-referable carotid distribution, is associated with significantly higher rates of related ischemic stroke in comparison with asymptomatic disease.[4,19] Differentiation between the two is critical in determining an appropriate treatment approach. As this article addresses the primary prevention of stroke,

it focuses on the patient with stable or asymptomatic carotid artery atherosclerosis.

This article discusses general approaches to primary preventive strategies for stable patients with atherosclerosis manifesting as asymptomatic carotid disease. Such approaches include strategies generally applicable to all patients with atherosclerotic vascular disease, including lifestyle interventions and medical therapies. In addition, options for carotid revascularization and considerations for appropriate patient selection are reviewed.

TESTING: DIAGNOSIS AND MONITORING
Diagnostic Testing

Although the key focus of this article is the primary prevention of stroke in patients who are found to have carotid artery disease, the question of screening and the follow-up of testing should be addressed. In the literature, there is debate as to whether screening should be performed; however, observational studies have associated the presence of a bruit on examination with cardiovascular risk.[2,3] Although there are differences in recommendations for screening and the population for which it is likely to be most beneficial,[1,14] multispecialty guidelines conclude it is reasonable to perform duplex ultrasonography in patients with auscultated bruits to determine if internal carotid artery stenosis is present.[4] In part, the decision of whether to test should depend on potential therapeutic decision making. Therefore, in patients who are otherwise on optimal medical therapy for reduction of risk associated with atherosclerotic vascular disease and are not candidates for carotid revascularization (see the section on revascularization), the benefit of testing is likely limited. In addition, the detection of atherosclerotic plaque as a mechanism to motivate patients to comply with lifestyle and medical therapy has not been shown to be effective.[20]

Monitoring in Patients with Known Carotid Artery Stenosis

If asymptomatic carotid stenosis is detected, lifestyle changes and optimal medical therapy are recommended regardless of the degree of stenosis. Serial duplex ultrasonographic assessment to assess the progression and stability of findings is reasonable for those in whom revascularization based on degree of stenosis would be considered. In these patients an initial assessment at 6 months followed by annual examinations for stable lesions is reasonable.[4] Indeed, progression of stenosis is a potent marker for heightened risk of stroke, and suggests a time when a risk/benefit assessment is more favorable for revascularization.[21] Data have not