## MEDICAL MYTHOLOGY

# Physical exam myths: listening for carotid artery bruits in stroke patients

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**ABSTRACT**
When a patient presents to the emergency department with a neurologic deficit and a cerebrovascular event is included in the differential diagnosis, the classic recommendation is to examine the carotid artery and assess for the presence of a bruit. The diagnostic yield and utility of this practice has seldom been called into question. This critical appraisal will review the practice of listening for a carotid artery bruit (CAB) in suspected stroke patients and analyze its clinical utility, including the sensitivity and specificity of a CAB for detecting a significant lesion and the potential impact a CAB may have on the investigation and disposition of such patients.

**Key words:** carotid artery bruit, stroke, significance, utility

**RÉSUMÉ**
Lorsqu'un patient se présente à l'urgence avec un déficit neurologique et que le diagnostic différentiel inclut un événement vasculaire cérébral, on recommande habituellement d'examiner l'artère carotide pour voir s'il y a présence d'un bruit. On a rarement remis en question le rendement et l'utilité diagnostiques de cette pratique. Cette évaluation critique examine la pratique qui consiste à rechercher un bruit de l'artère carotide (BAC) chez les patients que l'on croit atteints d'un AVC et en analyse l'utilité clinique, y compris la sensibilité et la spécificité d'un BAC pour détecter une lésion importante et son effet sur l'investigation et le traitement de ces patients.

## Clinical vignette and question

A 50-year-old man presents to the emergency department (ED) with a 5-hour history of right sided hemiparesis and aphasia. Is it necessary to listen for a carotid artery bruit (CAB) in such a patient? If a CAB is found, will its presence alter the patient's work-up and disposition?

## Introduction

When a patient presents to the emergency department with a neurologic deficit and a cerebrovascular event (CVE) is included in the differential diagnosis, the classic recommendation is to examine the carotid artery and assess for the presence of a bruit. It is advised that the area overlying the artery should be palpated gently for the presence and the intensity of the impulse. As well, it should be auscultated to allow detection of a bruit.[1] The diagnostic yield and utility of this practice has seldom been called into question.

The inherent assumptions of this approach are that a bruit is indicative of the likely source of the embolus that

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Received: Feb. 7, 2007; accepted: Mar. 30, 2007
*This article has not been peer reviewed.*
*Can J Emerg Med* 2007;9(5):368-70

caused the CVE and that a bruit suggests the presence of significant stenosis. The extension of these assumptions is that the detection of a bruit would alter the investigative strategy, the subsequent patient management, or both.

This critical appraisal will review the practice of listening for a CAB in suspected stroke patients and analyze its clinical utility, including the sensitivity and specificity of a CAB for detecting a significant lesion and the potential impact a CAB may have on the investigation and disposition of such patients.

### *Why not to listen for a CAB: CAB mimics!*

The exact location and method of listening for a CAB has never been established. The classic teaching is to search for a CAB over the region adjacent and posterior to the upper end of the thyroid cartilage to just below the angle of the mandible.[2]

Although the site of examination is well accepted, there is considerable interobserver variation among clinicians with regard to the interpretation of the key auditory characteristics of CABs for predicting stenosis.[3] Moreover, CABs may be heard in healthy patients; for example, a CAB may be detected in 20% of healthy children under 15 years old. Although this number is lower, the 4% detection rate in the adult population is an important factor to consider.[4]

Further, up to 75% of arteries with asymptomatic bruits do not have significant compromise in blood flow.[5]

Bruits that do not originate in the carotid artery, although usually different in character, can also mimic CABs. It is well appreciated that certain cardiac valve pathologies are associated with transmission of murmurs to the neck. Venous hums from internal jugular vein flow can also mimic a CAB.[3]

Other disease states can also cause a bruit over the carotid artery. An increase in regional vascular flow, such as that found in thyrotoxicosis, arterio-venous fistulas (even those occurring in nonadjacent regions, i.e., forearm arterio-venous fistulas in hemodyalisis patients) and anemia, can all produce similar findings.[6,7]

### *Why not to listen for a CAB: its lack of significance*

The obvious question that remains is does a detectable CAB indicate the presence of a significant lesion and does the absence of a CAB preclude the presence of a significant lesion?

The answer that the literature provides is very clear. Hemodynamically significant stenotic lesions may exist in the absence of an audible bruit.[8–10] Using 70%–99% stenosis on a carotid angiogram as a gold standard threshold, a CAB assessment has a sensitivity of 63%–76% and specificity of 61%–76% for clinically significant stenosis.[11]

Most patients with a stroke have nonsignificant lesions in the carotid arteries. In symptomatic and asymptomatic patients, respectively, significance is defined as either 50% or greater narrowing of the internal carotid artery lumen diameter or a 60% or greater narrowing of the internal carotid artery lumen diameter.

Both of these findings are associated with a high risk for a permanent stroke.[12,13] Clearly then, the detection or non-detection of a CAB will have little impact on patient disposition.

### *Will the presence of a CAB change further investigation and disposition?*

Irrespective of the detection of a CAB in the physical exam of a patient being investigated for possible CVE, most authorities would still recommend imaging studies.[1] Although the accepted gold standard for evaluation of carotid artery stenosis is catheter angiography, people being investigated for a possible CVE can be and often are evaluated further by noninvasive study of the carotid arteries. A 1995 meta-analysis of 70 studies comparing the accuracy of noninvasive diagnostic tests to carotid angiography concluded that carotid duplex and carotid doppler were equally effective, with a 70% or greater probability of diagnosing carotid stenosis.[14]

## Conclusions

An evaluation for the presence of CAB is taught in medical schools and on the wards as an obligatory part of the physical exam for a patient presenting with a possible CVE. Given its lack of specificity and sensitivity as well as its lack of utility in the investigation and management strategy of such a patient, the routine practice of listening for a CAB should be abandoned.

**Competing interests:** None declared.

## References

1. Betsy B, Love JB. Neurovascular system. In: Goetz CG, editor. Textbook of clinical neurology. 2nd ed. New York (NY): Elsevier; 2003. p. 994.

2. Ratcheson RA. Clinical diagnosis of atherosclerotic carotid artery disease. Clin Neurosurg 1982;29:464-81.

3. Chambers BR, Norris JW. Clinical significance of asymptomatic neck bruits. Neurology 1985;35:742-5.

4. Heyman A, Wilkinson WE, Heyden S, et al. Risk of stroke in asymptomatic persons with cervical arterial bruits: a population



https://doi.org/10.1017/S1481803500015323 Published online by Cambridge University Press

study in Evans County, Georgia. N Engl J Med 1980;302:862-3.

5. Quinones-Baldrich WJ, Moore WS. Asymptomatic carotid stenosis: rationale for management. Arch Neurol 1985;42:378-82.

6. Sauve JS, Laupacis A, Østbye T, et al. Does this patient have a clinically important carotid bruit? JAMA 1993;270:2843-5.

7. Caplan LR. Carotid-artery disease. N Engl J Med 1986;315:886-8.

8. Chambers BR, Norris JW. Outcome in patients with asymptomatic neck bruits. N Engl J Med 1986;315:860-5.

9. Kuller LH, Sutton KC. Carotid artery bruit: is it safe and effective to auscultate the neck? Stroke 1984;15:944-7.

10. Zwiebel WJ. Duplex sonography of the cerebral arteries: efficacy, limitations, and indications. Am J Radiol 1992;158:29-36.

11. Bosmans H, Marchal G, Van Hecke P, et al. MRA review. Clin Imaging 1992;16:152-67.

12. Davison BD. Arterial injuries: a sonographic approach. Radiol Clin North Am 2004;42:383-96.

13. North American Symptomatic Carotid Endarterectomy Trial Collaborators. Benefit of carotid endarterectomy in patients with symptomatic moderate or severe stenosis. N Engl J Med 1998; 339:1415-25.

14. Blakeley DD, Oddone EZ, Hasselblad V. Noninvasive carotid artery testing: a meta-analytic review. Ann Intern Med 1995;122 (5):360-367.

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https://doi.org/10.1017/S1481803500015323 Published online by Cambridge University Press