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Case Report

Dizziness and Carotid Artery Stenosis: What is the Relationship?

Frederick S. Fisher*, Benjamin J. Aumiller

Department of Vascular Surgery, Orlando VA Medical Center, Florida, USA

***Corresponding author:** Frederick S. Fisher, Department of Vascular Surgery, Orlando VA Medical Center, Florida, USA. Tel: +14076313219; Fax: +14075139685; Email: Frederick.Fisher@va.gov

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Practice Recommendations

Clearly define the nature of patient's dizziness with careful history.

A Good-quality patient-oriented evidence: Refer patient to ENT, neurology, cardiology, psychiatry based on classification of dizziness.

A Good-quality patient-oriented evidence: Reserve referral to vascular surgery for hemispheric or ophthalmologic symptoms associated with carotid stenosis, symptoms of vertebrobasilar ischemia, or asymptomatic high-grade carotid stenosis.

A Good-quality patient-oriented evidence: The "dizzy" patient is a frequent clinical encounter with approximately 5% of outpatients presenting with a primary symptom of dizziness [1]. This accounts for 7.5 million patient visits to providers each year [2]. Many of these patients have coexistent carotid artery stenosis, and it is tempting to associate the carotid stenosis with the dizziness etiologically. However, referral to vascular surgery should not always be the first choice. Rather, careful history needs to be performed to delineate the type of dizziness that the individual patient has. Common categories of dizziness include vertigo, disequilibrium, presyncope, and lightheadedness [1]. Such dizziness syndromes rarely require vascular surgical treatment. Rather, coexistent carotid stenosis may require treatment based on level of severity and generally should be considered asymptomatic if dizziness is the only complaint. In rare instances, vertebrobasilar ischemia may manifest as dizziness. Neurological consultation may be necessary to assist with this diagnosis. This systematic approach will benefit the patient by streamlining referral to the appropriate specialist.

Index Case

WT is a 66-year-old male with a history of insulin dependent diabetes, tobacco use, coronary artery disease status post placement of a coronary stent within 2 years of presentation, stage III chronic kidney disease, and Chronic Obstructive Pulmonary Disease (COPD). He presents to his physician with a two-week complaint of dizziness upon standing upright with symptoms lasting several minutes before abating. There is no associated vertigo, nausea, vomiting or syncope. He has no prior history of stroke, Transient Ischemic Attack (TIA), or amaurosis fugax. On exam, he is alert and oriented ×3. Temperature 98.6, pulse 72, BP 140/90 in each arm both standing and supine. There is a soft left carotid bruit. There is a soft grade 2/6 systolic murmur in aortic position. Remainder of the exam is normal. EKG shows normal sinus rhythm with heart rate 72, no arrhythmias seen.

Carotid artery stenosis, when symptomatic, presents with hemispheric symptoms such as unilateral weakness or numbness of the face or extremity, or ocular symptoms of amaurosis fugax [3], Controlled clinical trials have demonstrated benefit from surgical treatment for these symptomatic patients [3,4] with benefit maximal within 2 weeks from onset of symptoms. These studies did not consider or incorporate dizziness to be a symptom of carotid artery stenosis. Hence, there is no randomized controlled data to support surgical treatment for dizziness. Patients whose only complaint is dizziness are classified as asymptomatic in terms of the carotid artery. Treatment of carotid stenosis based on severity of stenosis may be considered on its own merit, with surgical option for lesions greater than 70%. Again, the purpose of carotid surgery is stroke prevention [5]. Dizziness as sole presentation is rarely harbinger of stroke or a symptom of carotid stenosis. Vermal cerebellar infarcts and intracranial steal syndromes consequent to complex cervicocephalic and intracranial stenosis are the rare exceptions.

Physicians should take a careful history whenever patients present with symptoms of dizziness. This allows the physician to distinguish among the four categories of dizziness to make the appropriate subspecialty referral. Vertigo comes with a sense of spinning and may best be evaluated by Otolaryngology to rule out inner ear pathology, particularly if Dix-Hallpike maneuver is positive. Disequilibrium involves a feeling of being off balance and may be due to gait dysfunction associated with Parkinson's disease, or peripheral neuropathy, requiring neurology consultation.

Presyncope involves near loss of consciousness, and may require cardiology evaluation to search for arrhythmias, coronary artery disease and orthostatic hypotension. A feeling of disconnection with one's surroundings may require psychiatric evaluation to rule out conditions such as anxiety, depression or panic disorder. Reactions to medications always need to be considered.

Carotid symptoms are caused by particles from the atherosclerotic plaque breaking loose and embolizing to the brain. When this event occurs, areas of the cerebral cortex may become ischemic leading to either transient ischemic attacks (symptoms under 24 hours) or completed stroke with numbness or weakness of face or extremities. The symptoms are unilateral, hence the term hemispheric. Speech may be affected with expressive aphasia, more often with left sided carotid stenosis but sometimes with right sided disease as well. Transient monocular blindness (amaurosis fugax) may occur with embolization to the retinal artery via the ophthalmic artery. In such cases, carotid endarterectomy may need to be performed even for carotid stenosis as low as 50%. Non-hemispheric symptoms do not have randomized, controlled data to support surgical treatment. Current data for treating asymptomatic carotid stenosis supports carotid endarterectomy for treatment of high-grade (greater than 70%) carotid stenosis if surgery can be performed with low morbidity and mortality (under 3%) [6]. Stenting of the carotid artery carries higher risk of stroke (4.1% versus 2.3%, P=0.01) [7], especially in older (>70 years), symptomatic patients [8]. Currently stenting is reserved for patients who have undergone neck irradiation [9,10], redo carotid surgery [11,12], or other difficult anatomic situations. None of the randomized trials produced any evidence for treatment of dizziness with surgery. In fact, current studies are underway randomizing surgery versus best medical therapy to determine whether carotid surgery will continue to be recommended for asymptomatic patients [13]. At the time of the randomized clinical trials, best medical therapy did not include the current generation of lipid-lowering agents and antiplatelet agents. Given this questioning of long held belief in the benefit of carotid endarterectomy for asymptomatic patients with high-grade stenosis to prevent stroke, it would be difficult to make the case for operating for the symptom of dizziness.

Carotid disease produces symptoms by arterial/arterial remobilization. Janczak et al. confirmed that certain cytokines (TGF-beta, VEGF, and TNF-alpha) were found in symptomatic carotid arteries but not in healthy controls [14]. Carotid disease does not typically produce symptoms from global ischemia of the brain. Even with a totally occluded carotid artery, there is often ample collateral flow to maintain adequate circulation to the brain [15]. On occasion, we even see totally asymptomatic patients with bilateral internal carotid artery occlusions here in the vascular surgery clinic. These patients maintain circulation to the brain via the external carotid arteries and vertebrobasilar pathway [16]. However, on occasion, there is a rare case of vertebrobasilar ischemia with symptoms of diplopia, ataxia, or "drop attacks". These cases may be more difficult to diagnose and therefore one must maintain this diagnosis in the differential. Treatment may include correction of carotid stenosis or extracranial vertebral artery reconstruction [17]. Again, these cases are less common.

The concept of carotid stenosis as a cause of dizziness remains as a fixture in the literature and in daily clinical practice. One reason this still exists is the use of the term cerebrovascular disease. This all-encompassing phrase includes not only carotid stenosis but also completed stroke. Unless the literature is reviewed carefully, it is understandable how this confusion still exists. The message from this article is that carotid stenosis does not lead to dizziness. The vascular surgeon may be called to treat posterior (vertebrobasilar) ischemic symptoms of the brain that effect the cerebellum and cranial nerve nuclei leading to diplopia, ataxia, or "drop attacks". These are different from the usual symptoms that patients complain of when they describe dizziness. Current articles are still being written emphasizing the association between carotid stenosis and dizziness [18]. In contradistinction the lack of association between dizziness and carotid stenosis has recently been systematically studied at the Department of Neurology in West China Hospital [19]. Between January 2012 and April 2014, a large group of 1139 patient with dizziness were prospectively studied with a propensity score matched group of 1139 patients without dizziness. The proportion of patients with vertebrobasilar artery stenosis was larger in the dizziness group (13.3% versus 7.6%) and was even larger among the patients with stroke histories (19.4% versus 11.2% in the matched cohort). Logistic regression analysis demonstrated that dizziness did not significantly predict carotid artery stenosis (P>0.01). Thus, we do finally have data that supports the long-standing clinical impression among vascular surgeons that dizziness is not associated with carotid artery stenosis. Again, this stems from understanding that the pathophysiology of symptomatic carotid stenosis is atheroembolic in nature.

We, as vascular surgeons, operate on the carotid artery to prevent stroke. Stroke is the third most common cause of death in the United States. Only heart disease and cancer cause more deaths. There are approximately 800,000 strokes in the United States each year [20]. It is a major cost driver in today's health care system. The lipid-lowering agents and newer antiplatelet agents may be found to be just as effective as surgical treatment; however, we must await results of ongoing prospective clinical trials (Carotid Revascularization Endarterectomy versus STenting trial CREST 2) before drawing this conclusion [21]. The SAMMPRIS trial comparing interventional stenting therapy versus best medical therapy, with particular emphasis on lifestyle factor correction was particularly noteworthy with medical therapy surprisingly more effective [22]. The pleiotropic effects of the statins (in particular their anti-inflammatory effects) may be involved in this medical benefit. Current guidelines call for specific low-density lipoprotein

cholesterol levels for specific risk categories with target less than 55 milligrams per deciliter in the extreme risk category, less than 70 milligrams per deciliter in the very high-risk category and less than 100 milligrams per deciliter in the high-risk category. Guidelines also recommend considering fenofibrate therapy in patients who have elevated triglycerides, low HDL-C, and recurrent atherosclerotic cardiovascular disease events despite aggressive statin therapy [23]. While awaiting results from CREST 2, we must continue to practice evidence based medicine per established guidelines. Under these guidelines, there is no evidence to indicate carotid surgery, either open endarterectomy or stenting, for the various forms of dizziness. These patients need to be diagnosed based on excellent history taking and then guided to the appropriate specialty service.

Vertigo	ENT evaluation for inner ear pathology
Disequilibrium	Neurology evaluation for gait dysfunction and peripheral neuropathy
Presyncope	Cardiology evaluation for arrhythmias, coronary artery disease, and orthostatic hypotension
Disconnected feeling	Psychiatric evaluation for anxiety, depression and panic disorder.

Table 1: Differential Diagnosis for Dizziness and Workup Needed.

References

1. Post RE, Dickerson LM (2010) Dizziness: A diagnostic approach. American Family Physician 82: 361-368.
2. Schneider JI, Olshaker JS (2012) Vertigo, vertebrobasilar disease, and posterior circulation ischemic stroke. Emergency Medicine Clinics of North America 30: 681-693.
3. Ricotta JJ, and Ricotta JJ (2014) Carotid artery disease: Decision making including medical therapy. In: Rutherford's Vascular Surgery Eighth edition, 1496-1513.
4. Mokin M, and Levy EI Endovascular therapy of extracranial and intracranial occlusive disease. In: Stroke: Pathophysiology, Diagnosis, and Management, Sixth Edition, 1047-1057.
5. Walker MD, Marler JR, Goldstein M (1995) Endarterectomy for asymptomatic carotid artery stenosis. JAMA 273: 1421-1428.
6. Lanzino G, Rabinstein AA, Brown RD (2009) Treatment of Carotid Artery Stenosis: Medical Therapy, Surgery, or Stenting? Mayo Clinic Proceedings 84: 362-368.
7. Brott TG, Hobson RW, Howard G, Roubin GS, Clark WM, et al. (2010) Stenting versus endarterectomy for treatment of carotid-artery stenosis. N Engl J Med 363: 11-23.
8. Paraskevas KI, Veith FJ (2015) The indications of carotid artery stenting in symptomatic patients may need to be reconsidered. Annals of Vascular Surgery 29: 154-159.
9. Cam A, Shishehbor M, Bajaj N (2012) The outcomes of percutaneous stenting of patients with carotid artery stenosis and neck radiation. JACC 59: E251.
10. Ravin RA, Gottlieb A, Pasternac K, Cayne N, Schneider D, et al. (2015) Carotid artery stenting may be performed safely in patients with radiation therapy-associated carotid stenosis without increased restenosis or target lesion revascularization. J Vasc Surgery 62: 624-630.
11. Huang Y, Bower TC, Kalra M, Oderich G, DeMartino RR, et al. (2017) Carotid reoperation and carotid artery stenting have similar early and late results in patients with carotid restenosis. J Vasc Surgery 65: 91S.
12. Rockman CB, Bajakian D, Jacobowitz GR, Maldonado T, Greenwald U, et al. (2004) Impact of carotid artery angioplasty and stenting on management of recurrent carotid artery stenosis. Ann Vasc Surgery 18: 151-157.
13. Howard VJ, Meschia JF, Lal BK, Turan TN, Roubin GS, et al. (2017) Carotid revascularization and medical management for asymptomatic carotid stenosis: Protocol of the CREST-2 clinical trials. Int J Stroke 12: 770-778.
14. Janczak D, Ziolkowski P, Garcarek J, Janczak D Jr, Dorobisz K, et al. (2014) The cytokines within the carotid plaque in symptomatic patients with internal carotid stenosis. J Cardiothoracic Surg 15: 139.
15. Hackam DG (2016) Prognosis of asymptomatic carotid artery occlusion: Systematic review and meta-analysis. Stroke 47: 1253-1257.
16. Friedman SG, Lamparello PJ, Riles TS, Imparato AM, Sakwa MP, et al. (1987) Surgical management of the patient with bilateral internal carotid artery occlusion. J Vasc Surgery 5:715-718.
17. Berguer R, Flynn LM, Kline RA, Caplan L, et al. (2000) Surgical reconstruction of the extracranial vertebral artery: Management and outcome. J Vasc Surgery 31:9-18.
18. Hsu L, Chang F, Teng MM, Chern CM, Wong WJ, et al. (2014) Impact of carotid stenting in dizzy patients with carotid stenosis. J Chin Med Assoc 77: 403-408.
19. Chen H, Shi Z, Feng H, Wang R, Zhang Y, et al. (2015) The relationship between dizziness and cervical artery stenosis. Neuro Report 26: 1112-1118.
20. Hack N (2017) Stroke, Secondary Prevention. In Ferri's Clinical Advisor, 1215-1216.
21. Brajesh KL, Meschia JF, and Brott TG (2017) The clinical need, design, and goals for CREST-2. Semin Vasc Surg 2-7.
22. Turan TN, Nizam A, and Lynn MJ, Egan BM, Le NA, et al. (2017) Relationship between risk factor control and vascular events in the SAMMPRIS trial. Neurology 88: 379-385.
23. http://www.acc.org/latest-in-cardiology/articles/2017/08/11/08/35/aace-and-eas-lipid-guidelines.