

# INTERNAL MEDICINE ALERT

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## INSIDE

*Diastolic dysfunction predicts incident heart failure*  
page 147

*Sleep-disordered breathing and dementia*  
page 148

*Indacaterol inhaler for COPD*  
page 149

### Financial Disclosure:

*Internal Medicine Alert's* editor, Stephen Brunton, MD, serves on the advisory board for Amylin, Boehringer Ingelheim, Novo Nordisk, and Symbiotix; he serves on the speakers bureau of Boehringer Ingelheim, Novo Nordisk, and Teva. Peer reviewer Gerald Roberts, MD, reports no financial relationship to this field of study.

## New Guidelines for the Management of Extracranial Carotid Arterial Disease

ABSTRACT & COMMENTARY

By *Harold L. Karpman, MD, FACC, FACP*

*Clinical Professor of Medicine, UCLA School of Medicine*

*Dr. Karpman serves on the speakers bureau for Forest Laboratories.*

**Synopsis:** Duplex ultrasonography should be used in asymptomatic patients with known or suspected carotid arterial stenosis and should be considered for use in asymptomatic patients who have symptomatic peripheral arterial disease, coronary artery disease, or an atherosclerotic aortic aneurysm, and even in the asymptomatic patients who simply are at high cardiovascular risk.

**Source:** Brott TG, et al. 2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAIP/SCAI/SIR/SNIS/SVM/SVS Guideline on the management of patients with extracranial carotid and vertebral artery disease: Executive summary. *Circulation* 2011;124:489-532.

THE AMERICAN COLLEGE OF CARDIOLOGY FOUNDATION (ACCF) AND THE American Heart Association (AHA) have been jointly engaged in creating guidelines for cardiovascular disease since 1980. The 2011 update on the management of patients with extracranial carotid and vertebral artery disease<sup>1</sup> includes contributions by members of the American Stroke Association, American Association of Neuroscience Nurses, American Association of Neurological Surgeons, American College of Radiology, American Society of Neuroradiology, Congress of Neurological Surgeons, Society of Atherosclerosis Imaging and Prevention, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of NeuroInterventional Surgery, Society for Vascular Medicine, Society for Vascular Surgery, American Academy of Neurology, and Society of Cardiovascular Computed Tomography. The writing Task Force developed graded evidence-based recommendations using previously accepted and standardized techniques.<sup>2</sup>

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The guidelines strongly recommend the use of duplex ultrasonography in asymptomatic patients with known or suspected carotid arterial stenosis and also indicated that its use should be considered to detect carotid arterial stenosis in asymptomatic patients who have symptomatic peripheral arterial disease, coronary artery disease, or an atherosclerotic aortic aneurysm, and even in the asymptomatic patients who simply are at high cardiovascular risk. Duplex ultrasonography is also recommended as the initial evaluation of patients with focal transient retinal or hemispheric neurological symptoms and the guidelines also recommend that magnetic resonance angiography (MRA) or computed tomography angiography (CTA) should be performed to detect carotid stenosis when sonography either cannot be obtained or yields equivocal or otherwise nondiagnostic results.

With respect to the recommendations for selection of patients for carotid revascularization, the guidelines recommend that patients at average or low surgical risk who have experienced nondisabling ischemic stroke or transient cerebral ischemic symptoms, including hemispheric events or amaurosis fugax, should undergo carotid endarterectomy (CEA) within 6 months of the episode if the diameter of the ipsilateral internal carotid artery is reduced by more than 70% on noninvasive imaging or by more than 50% on catheter angiography. Carotid arterial stenting (CAS) is recommended as an alternative to CEA for symptomatic patients who have an average or low risk of complications associated with endovascular intervention. The selection of asymptomatic patients for carotid revas-

cularization should be guided by an assessment of the patient's comorbid conditions, life expectancy, and other individual factors involved in that patient's overall medical condition. It is considered reasonable to select CEA over CAS when revascularization is indicated, even in older patients when the arterial phleboanatomy is unfavorable for endovascular intervention and to select CAS over CEA when revascularization is indicated in patients whose neck anatomy is unfavorable for arterial surgery. Carotid revascularization is not recommended when the atherosclerotic lesion narrows the lumen by less than 50%, when the carotid artery is totally occluded on a chronic basis, or for patients with severe disability caused by cerebral infarction that precludes preservation of useful function.

Aspirin (81-325 mg daily) is recommended before a CEA and may be continued indefinitely postoperatively. After the first month following surgery, drug recommendations are that aspirin (75 to 325 mg daily), clopidogrel (75 mg daily), or a combination of low-dose aspirin plus extended-release dipyridamole (25 and 200 mg) twice daily should be administered for long-term prophylaxis against ischemic cardiovascular events. Before and after either CEA or CAS, antihypertensive medication is recommended if needed for control of blood pressure; smoking cessation should be recommended; diabetes should be carefully controlled; and the administration of statin lipid-lowering medication for prevention of ischemic events is reasonable irrespective of the serum lipid levels. The use of embolic protection devices during CAS can be beneficial to reduce the risk of stroke even when the risk of vascular injury is low. Noninvasive imaging of the extracranial carotid arterial system is reasonable 1 month, 6 months, and annually after revascularization to assess patency and exclude the development of new or contralateral lesions.

In patients with neurological symptoms referable to the posterior circulation and in those with a subclavian steal syndrome, noninvasive imaging by CTA or MRA rather than ultrasound imaging is appropriate for the initial evaluation for the detection of significant vertebral artery disease. If detected, vertebral artery atherosclerosis should be treated with lifestyle modification and medical therapy similar to the therapy administered to patients with extracranial carotid atherosclerosis.

## ■ COMMENTARY

In summary, the 2011 Guideline on the Management of Patients with Extracranial Carotid and Vertebral Artery Disease<sup>1</sup> is an extensive document written by a Task Force of 14 major cardiovascular organizations. The Task Force evaluated 368 references before writing the executive summary which is extremely thorough and has much more detail than could be included in this brief summary. Clinicians are strongly advised to consult this document for the more detailed recommendations of the Task Force.<sup>1</sup> ■

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#### Questions & Comments

Please call **Neill Kimball**,  
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# Progression of Diastolic Dysfunction Predicts Incident Heart Failure

ABSTRACT & COMMENTARY

By Andrew J. Boyle, MBBS, PhD

Assistant Professor of Medicine, Interventional Cardiology, University of California, San Francisco, CA

Dr. Boyle reports no financial relationships relevant to this field of study.

This article originally appeared in the October issue of *Clinical Cardiology Alert*. At that time it was peer reviewed by Ethan Weiss, MD, Associate Professor of Medicine, Division of Cardiology, University of California, San Francisco, CA. Dr. Weiss is an advisory board member for Bionovo.

**Synopsis:** The authors conclude that in a population-based cohort undergoing 4 years of follow-up, the prevalence of diastolic dysfunction increased and that diastolic dysfunction was associated with development of heart failure during 6 years of subsequent follow-up.

**Source:** Kane GC, et al. Progression of left ventricular diastolic dysfunction and risk of heart failure. *JAMA* 2011;306:856-863.

APPROXIMATELY HALF OF ALL CASES OF HEART FAILURE occur in the context of normal systolic function (heart failure with preserved ejection fraction [HFPEF]) and the number of cases is projected to rise as the population ages. Diastolic dysfunction on echocardiography has been associated with HFPEF in cross-sectional studies. However, the effect of progression of diastolic dysfunction, assessed by serial echocardiograms, on the risk for subsequent heart failure is not known. Accordingly, Kane and colleagues studied the longitudinal changes in diastolic function over a 4-year period in a community cohort and then studied the incidence of heart failure in the subsequent 6 years.

In 1997, 4203 persons older than 45 years of age in

Olmsted County, Minnesota, were invited to participate in the study. A total of 2042 participated in the first examination and 1402 returned for the subsequent examination 4 years later. Echocardiographic parameters of diastolic function included mitral inflow pulsed Doppler E/A ratio, pulmonary venous flow, and medial mitral annular tissue Doppler velocity. Participants were graded into four categories: normal diastolic function, mild, moderate, or severe diastolic dysfunction.

The mean age of the cohort was 65 years at the second visit, with 53% being younger than 65 years of age. More than 95% were white, 49% were male, and mean BMI was 28. Over the 4 years between the first and second echocardiogram, the prevalence of hypertension, diabetes, coronary artery disease, and heart failure all increased ( $P \leq 0.001$ ). Accordingly, more patients were also taking cardiac medications at the second examination, and the recorded blood pressure was actually lower at the second examination. Diastolic dysfunction prevalence increased from 24% to 39% ( $P < 0.001$ ). The prevalence of systolic dysfunction did not change and the mean ejection fraction actually increased (63.9% vs 65.9%,  $P < 0.001$ ). Individuals demonstrated worsening diastolic function in 23%, unchanged diastolic function in 68%, and improved diastolic function in 9%, and worsening of diastolic function was significantly associated with age  $> 65$  years (odds ratio 2.85).

During 6.3 years of follow-up after the second echocardiogram, the development of heart failure correlated with diastolic function at echocardiogram 2. The incidence of heart failure was 2.6%, 7.8%, and 12.2% in persons with normal diastolic function, mild diastolic dysfunction, and moderate or severe diastolic dysfunction, respectively ( $P < 0.001$ ). Multivariate analysis identified the following five independent predictors of incident heart failure: age (hazard ratio [HR] 8.38), hypertension (HR 2.21), coronary artery disease (HR 2.07), diastolic dysfunction (HR 1.81), and diabetes (HR 1.77). The authors conclude that in a population-based cohort undergoing 4 years of follow-up, the prevalence of diastolic dysfunction increased and that diastolic dysfunction was associated with development of heart failure during 6 years of subsequent follow-up.

## ■ COMMENTARY

This longitudinal study demonstrates that over a short period of time (4 years), diastolic dysfunction occurred in nearly one-quarter of the cohort. This is a staggeringly high number in view of the fact that the majority of the cohort was younger than 65 years of age. In addition, the power of diastolic dysfunction to predict subsequent heart failure was of a similar order of magnitude to diabetes, hypertension, and coronary artery disease. This has prognostic implications not only for our elderly patients, but also for our middle-age patients. Unfortunately, the therapeutic implications remain unclear. Is there some way to

impact the development of heart failure in patients diagnosed with diastolic dysfunction? Currently that remains unknown, and we can only control risk factors such as hypertension as best we can, and recommend adherence to diet and lifestyle modifications that are shown to be of long-term benefit.

This study is strengthened by the longitudinal nature of the serial echocardiographic evaluations. Furthermore, because Olmsted County residents are studied longitudinally, the authors were able to compare the outcomes of those who did not return for the second examination with those who did return. Nonreturners often confound observational studies, but not this study. Here, nonreturners had more co-morbidities and a higher subsequent mortality. Thus, the fact that they did not return for follow-up likely underestimated the effects of diastolic dysfunction on subsequent heart failure. There are several limitations to the study. First, the population was almost completely white, and so the results may not be generalizable to other populations. In fact, it would be reasonable to expect that the prevalence of diastolic dysfunction may be even higher in other ethnic or racial groups. Second, we are not told of how progression of diastolic dysfunction affects the risk of heart failure. The participants were classified according to their diastolic function at the second visit, not according to the change in diastolic function over the 4-year period. Thus, we are left to ponder the role of change in diastolic function in the management of these patients. Finally, we are not told what factors were associated with deteriorating or improving diastolic function. Do diet or lifestyle factors, obesity, or even medications change one's diastolic function over time? More study in this area is needed, but for now, we should consider diastolic dysfunction a marker of risk for heart failure and recommend adherence to diet and lifestyle factors that may improve outcomes. ■

## Sleep-Disordered Breathing is a Risk Factor for Dementia

ABSTRACT & COMMENTARY

By Michael Lin, MD

Associate Professor of Neurology and Neurosciences, Weill Cornell Medical College

Dr. Lin reports no financial relationships relevant to this field of study.

This article originally appeared in the October issue of *Neurology Alert*. At that time it was peer reviewed by M. Flint Beal, MD, Anne Parrish Titzel Professor, Department of Neurology and Neuroscience, Weill Cornell Medical Center, New York, NY. Dr. Beal reports no financial relationships relevant to this field of study.

**Synopsis:** Sleep-disordered breathing is a significant risk factor for cognitive decline and continuous positive airway pressure (CPAP) therapy may prevent or slow this process.

**Source:** Yaffe K, et al. Sleep-disordered breathing, hypoxia, and risk of mild cognitive impairment and dementia in older women. *JAMA* 2011;306:613-619.

SLEEP-DISORDERED BREATHING AFFECTS UP TO 60% OF older adults. It is associated with adverse health outcomes, including hypertension and diabetes. In their recent article, Yaffe and colleagues now report the first longitudinal association of sleep-disordered breathing with later development of mild cognitive impairment (MCI) or dementia.

A sample of 298 older women without dementia, participating in a study of osteoporotic fractures, had baseline cognitive testing and underwent overnight in-home polysomnography. More than one-third had sleep-disordered breathing, defined by an apnea-hypopnea index > 15 events/hour, but those with and without sleep-disordered breathing did not differ at baseline. Cognition was reassessed approximately 5 years later, and 44.8% of subjects with sleep-disordered breathing developed MCI or dementia compared with 31.1% of subjects without sleep-disordered breathing. When adjusted for age, race, education, BMI, smoking, diabetes, hypertension, use of antidepressants, benzodiazepines, or other anxiolytics, and baseline cognitive scores, the odds ratio was 2.36 (95% confidence interval 1.34-4.13). The authors also examined which effects of sleep-disordered breathing were most critical in mediating the risk for MCI or dementia. Measures of hypoxia were associated with increased incidence of MCI or dementia, but measures of sleep fragmentation or duration were not. This is consistent with the known sensitivity of the hippocampus to hypoxia, and the importance of the hippocampus in MCI and dementia.

### ■ COMMENTARY

This work has implications for prevention and treatment of dementia. Sleep-disordered breathing and cognitive deterioration are both extremely common in aging, and even a modest effect of (CPAP) therapy or possibly oxygen supplementation in decreasing the risk for MCI and dementia could have a large impact. In subjects who already have Alzheimer's disease, trials of CPAP for sleep-disordered breathing have shown slowed deterioration or even improvement in cognition. Thus, sleep-disordered breathing should be considered in all patients with MCI or dementia, and treatment initiated if appropriate. ■

# Indacaterol Inhalation Powder (Arcapta™ Neohaler)

By William T. Elliott, MD, FACP, and James Chan, PharmD, PhD

Dr. Elliott is Chair, Formulary Committee, Northern California Kaiser Permanente; and Assistant Professor of Medicine, University of California, San Francisco. Dr. Chan is Pharmacy Quality and Outcomes Manager, Kaiser Permanente, Oakland, CA.

Drs. Elliott and Chan report no financial relationships relevant to this field of study.

**A**N ULTRA LONG-ACTING, ORALLY-INHALED BETA<sub>2</sub>-ADRENERGIC agonist (LABA) has been approved for the treatment of chronic obstructive pulmonary disease (COPD). Indacaterol is formulated as a dry powder and is the first beta<sub>2</sub>-agonist to be dosed once-daily. It is marketed by Novartis as Arcapta™.

### Indications

Indacaterol is approved for the treatment of airflow obstruction in patients with COPD, including chronic bronchitis and/or emphysema.<sup>1</sup>

### Dosage

The recommended dose is 75 mcg inhaled once daily using the Neohaler inhaler.<sup>1</sup> Indacaterol is available as hard capsules each containing containing 75 mcg of inhalation powder.

### Potential Advantages

Indacaterol has a long effective half-life (40 to 56 hours) and is dosed once-daily compared to salmeterol and formoterol which are dosed twice-daily.

### Potential Disadvantages

Indacaterol shares the same warning for increased risk of asthma-related death as other LABAs, although it is not clear if this applies to COPD patients.

### Comments

Indacaterol is an LABA. The efficacy of the FDA-approved dose of 75 mcg daily was shown in two 12-week, Phase 3, placebo-controlled studies involving 641 patients with COPD.<sup>1</sup> Subjects were 40 years of age or older, had smoking histories of at least 10 pack years, post-bronchodilator FEV<sub>1</sub> less than 80%, and at least 30% of

the predicted normal value and post-bronchodilator ratio of FEV<sub>1</sub>/FVC of less than 70%. The primary efficacy endpoint, trough FEV<sub>1</sub> values at 12 weeks, were 1.38 liters for indacaterol and 1.26 liters for placebo, treatment difference (95% confidence interval [CI]) of 0.12 L (0.08, 0.15) in one study and 1.49 L and 1.35 L (treatment difference 0.14 L [0.10, 0.18]) in the second study. The bronchodilatory effect was observed 5 minutes after dose administration with the peak effect occurring at 4 hours. Improvement of pulmonary function was maintained over 12 weeks.

In addition, there was reduced use of short-acting beta<sub>2</sub>-agonists and improvement in health-related quality of life as measured by the St. George Respiratory Questionnaire. Indacaterol was generally well tolerated. Common adverse events included cough (6.5%), nasopharyngitis (5.3%), and headache (5.1%).<sup>1</sup> In a 12-week randomized, parallel-group study in patients with moderate-to-severe COPD (n = 1123), indacaterol 150 mcg once-daily was statistically more effective than salmeterol 50 mcg twice-daily in terms of lung function (FEV<sub>1</sub> difference of 60 mL, 95% CI: 35, 79).<sup>2</sup> In a study involving similar patients (n = 1598), indacaterol was at least as effective as tiotropium 18 mcg in terms of lung function, but more effective in clinical outcomes and was associated with lower use of albuterol rescue.<sup>3</sup> The FDA only approved the 75 mcg dose, concluding that there was no statistically significant difference among the three doses and deciding not to approve the higher doses.<sup>4</sup> In Europe, however, the 150 mcg and 300 mcg doses are available (e.g., Onbrez Breezhaler).

### Clinical Implications

Indacaterol is the first once-daily beta<sub>2</sub>-agonist to be approved for COPD in the United States. Long-acting agents are indicated for patients with moderate to very severe COPD.<sup>5</sup> ■

### References

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Upon completion of this educational activity, participants should be able to:

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- describe the advantages, disadvantages and controversies surrounding the latest advances in the diagnosis and treatment of disease;
- identify cost-effective treatment regimens;
- explain the advantages and disadvantages of new disease screening procedures.

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## CME Questions

1. **The 2011 guidelines for the treatment of carotid arterial disease recommend that patients who are at average or low surgical risk and who have experienced nondisabling ischemic stroke or transient cerebral ischemic symptoms should undergo carotid endarterectomy within 6 months of the episode if the diameter of the ipsilateral carotid artery is reduced by:**
  - a. more than 50% on noninvasive imaging or more than 30% on catheter angiography.
  - b. at least 60% on noninvasive imaging.
  - c. more than 70% on noninvasive imaging or more than 50% on catheter angiography.
  - d. more than 50% if the contralateral carotid artery is also reduced by at least 50%.
2. **CPAP therapy may slow deterioration in patients with Alzheimer's disease.**
  - a. True
  - b. False

By Louis Kuritzky, MD, Clinical Assistant Professor, University of Florida, Gainesville

Dr. Kuritzky is an advisor for Endo, Kowa, Pricara, and Takeda.

## How Often Do You Really Have to See Patients on Warfarin?

**Source:** Rose AJ, et al. *Chest* 2011;140:359-365.

IT HAS BEEN CUSTOMARY TO ASK PATIENTS on warfarin, once controlled and stable, to return on a monthly basis for recheck. This interval has been based on tradition, rather than any firm scientific basis. Frequent visits in otherwise stable patients present a significant burden of time, cost, inconvenience, and even the opportunity for overzealous “fine tuning,” and may not enhance the amount of time spent in the therapeutic range. It would, therefore, be desirable to have better insight into whether stable patients might be safely allowed longer intervals without risking either toxicity of supratherapeutic warfarin dose, or thrombotic risk of subtherapeutic levels.

Rose et al report on data obtained from a large population of persons receiving anticoagulation from the U.S. Veterans hospital system (n = 104,451). By comparing the interval between an in-range international normalized ratio (INR) and the next INR measurement with the likelihood of being in the therapeutic range on follow-up visit, they were able to discern that the first two visits after a therapeutic INR measurement are time sensitive: that is, extending the time until next follow-up beyond 4 weeks was associated with progressively greater likelihood of finding an out-of-range INR at the next visit. This relationship, however, was not seen in persons with consistently in-range INR readings, i.e., if a patient had experienced three consecutive INR in-range visits, extending the length of time until next follow-up was not associated with greater likelihood of an out-of-range INR.

At the current time, another trial comparing monthly with quarterly INR monitoring is underway. Pending results from that trial, this evidence suggests that until

patients have at least three consecutive stable INR measurements, the traditional 4-week return policy is best. After that, a longer interval until next INR measurement is acceptable, but has only been studied as far out as 38 days. ■

## Replacing Carbohydrates with Nuts in the Diabetic Diet

**Source:** Jenkins DJ, et al. *Diabetes Care* 2011;34:1706-1711.

CONSUMPTION OF NUTS, ESPECIALLY WALNUTS, has been associated with favorable health outcomes. For diabetics, maintenance of a healthy body weight, reduction of high-glycemic index foods, and lipid modulation through diet are each a potentially critical consideration. Because nuts have significant fat content, there has been concern that were diabetics to substitute nuts for other carbohydrates, a detrimental impact on either weight or lipids might be seen.

Jenkins et al randomized type 2 diabetics (n = 117) to substitute carbohydrates in their diets in one of three ways: mixed nut replacement, muffin replacement, or half-and-half nuts plus muffins. Based on energy requirements calculated with the Harris-Benedict equation, participants were asked to substitute their prescribed replacement supplement for whatever carbohydrate had previously comprised an equal caloric proportion of their diet. For instance, a person requiring 1600-2400 kcal/d was given 475 kcal of a replacement supplement. The trial lasted 3 months. The nut mix consisted of almonds, pistachios, walnuts, pecans, hazelnuts, peanuts, cashews, and macadamias. The muffin was whole wheat, with no sugar added. The absolute kcal content of the supplement was the same whether administered as nuts, muffin, or mixed.

The group supplemented with nuts

enjoyed a statistically significant A1c reduction of 0.21%, but no significant A1c change was seen in the other two groups. Similarly, cholesterol, LDL, and cholesterol:HDL ratios were most favorably affected by the nut supplement. Nut replacement for carbohydrates has favorable effects in type 2 diabetes. ■

## Hypertensive Emergency: The Prognostic Value of Elevated Troponins

**Source:** Afonso L, et al. *J Clin Hypertens* 2011;13:551-556.

HYPERTENSIVE EMERGENCY, CHARACTERIZED by marked elevation of blood pressure (typically > 180/120) associated with signs of target organ damage, is a common presenting issue in emergency departments. Since cardiac toxicity may be one of the signs of target organ damage, troponins are often measured, even though there may be no symptoms of myocardial ischemia or signs on EKG. Especially when troponins are measured in acute coronary syndromes, they have strong prognostic value. Whether they provide any discriminative value in persons with hypertensive emergency has not been previously well-studied.

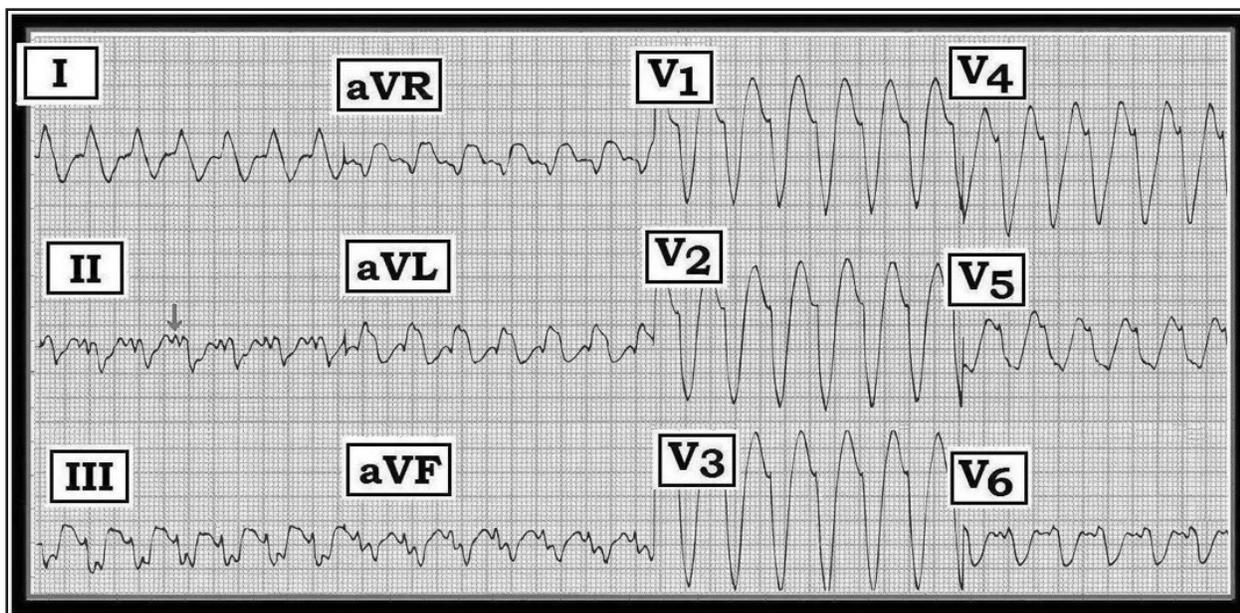
A retrospective analysis was done on all patients with hypertensive emergency seen at two inner-city population hospitals in Detroit (n = 567) in whom troponins had been measured. Among this group, one-third demonstrated troponin elevation (mean peak = 4.06 ng/mL). However, follow-up of these patients did not find that the presence or degree of elevation of troponins predicted subsequent mortality over the next 3 years.

Elevation of troponins is commonly seen in patients with hypertensive emergency, but in the absence of an acute coronary syndrome, is not prognostically valuable. ■

## A WCT with 'P' Waves?

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**Scenario:** Interpret the 12-lead ECG shown above obtained from a hemodynamically stable patient with underlying heart disease and new-onset palpitations. Despite the apparent QRS widening — is this sinus tachycardia (arrow pointing to 'P waves' in lead II)?

**Interpretation:** The most important consideration in this case is that the patient is hemodynamically stable despite the tachycardia. This means that there is at least a moment of time to contemplate what the rhythm is likely to be. There looks to be a regular wide complex tachycardia (WCT) at a rate of about 150/minute. Although it is possible that a WCT may be supraventricular, the diagnosis of ventricular tachycardia (VT) is statistically far more likely. Despite the arrow in lead II, there are no definite P waves on this tracing. Instead, simultaneously obtained lead I suggests that the *pseudo-P* upright deflection under the arrow corresponds to the initial portion of the QRS complex. This is confirmed by the markedly widened QRS complexes present in all other leads. The rhythm is ventricular tachycardia.

Important points to emphasize from this case include the following:

- VT is by far the most common cause of a WCT when

there is either no atrial activity or uncertain atrial activity. Statistical odds that a WCT without P waves is VT rather than supraventricular tachycardia with preexisting bundle branch block or aberrant conduction *exceed* 90% when the patient in question has underlying heart disease.

- Not all patients in VT immediately decompensate. Some may remain hemodynamically stable despite ongoing VT for hours, or even days.

- Obtaining a 12-lead tracing *during* tachycardia may be invaluable for honing in on the etiology of a tachycardia. In this case, there are a number of clues that overwhelmingly suggest VT as the diagnosis. These include: 1) marked QRS widening in all other leads; 2) bizarre QRS axis during the tachycardia (*extreme left axis deviation*); 3) bizarre QRS morphology (*not resembling any form of organized bundle branch block*); 4) markedly negative QRS complex in lead left-sided V6 (*which virtually always has more than a tiny r wave of positive activity*); and 5) concordance of the QRS in precordial leads (*all precordial lead QRS complexes are predominantly negative*). Bottom line: 12 leads are better than one — and a WCT without definite P waves should always be presumed to be VT until proven otherwise, regardless of whether the patient is hemodynamically stable. ■