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Letter to the editor

Dilated cardiomyopathy following use of xenadrine EFX

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Abstract

We describe a case of a 35-year-old man presented at the emergency room of our institution with acute onset of dyspnea and dizziness. He was a body builder and had been using Xenadrine EFX for weight loss reduction. The laboratory analyses were normal. A chest radiograph showed an enlarged cardiac silhouette with clear lung fields. Transtoracic two-dimensional color Doppler echocardiography revealed a diffuse hypokinesia with a marked decreased in systolic function and a high teledyastolic diameter. This case document the possible relation to use of Xenadrine EFX for weight loss and the recurrence of dilated cardiomyopathy.

Keywords

dilated cardiomyopathy, weight loss, xenadrine

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Summary

Ephedra alkaloids are naturally occurring stimulants widely used to enhance athletic performance and to promote weight loss. These substances have been associated with adverse cardiovascular events, including acute myocardial infarction, hypertension, myocarditis, lethal cardiac arrhythmias, stroke, coronary thrombosis, and vasospasm. No reports on dilated cardiomyopathy secondary to use of Xenadrine EFX are published.

Case presentation

A 35-year-old man presented at the emergency room of our institution with acute onset of dyspnea and dizziness. There was no family history of coronary artery disease (CAD), no history of diabetes, hypertension, hypercholesterolemia, smoking, or alcohol consumption. He was a body builder and had been using Xenadrine EFX throughout the previous four months for weight loss reduction.

On physical examination, the patient was a well-built, robust young man who was 1.72 m tall and weighed 82 kg. The blood pressure values were 130/70 mmHg, and the pulse was 72 beats/min. The jugular venous pressure was normal, and the lung fields were clear. There was no precordial pain. The apex beat was not displaced. The first heart sound was normal, and the second heart sound was widely but physiologically split.

The electrocardiogram (ECG) revealed an atrium right rhythm, normal atrio-ventricular conduction and no alteration or repolarization profile (Figure 1).

A chest radiograph showed an enlarged cardiac silhouette with clear lung fields. Laboratory analyses revealed normal serum troponin T level, a

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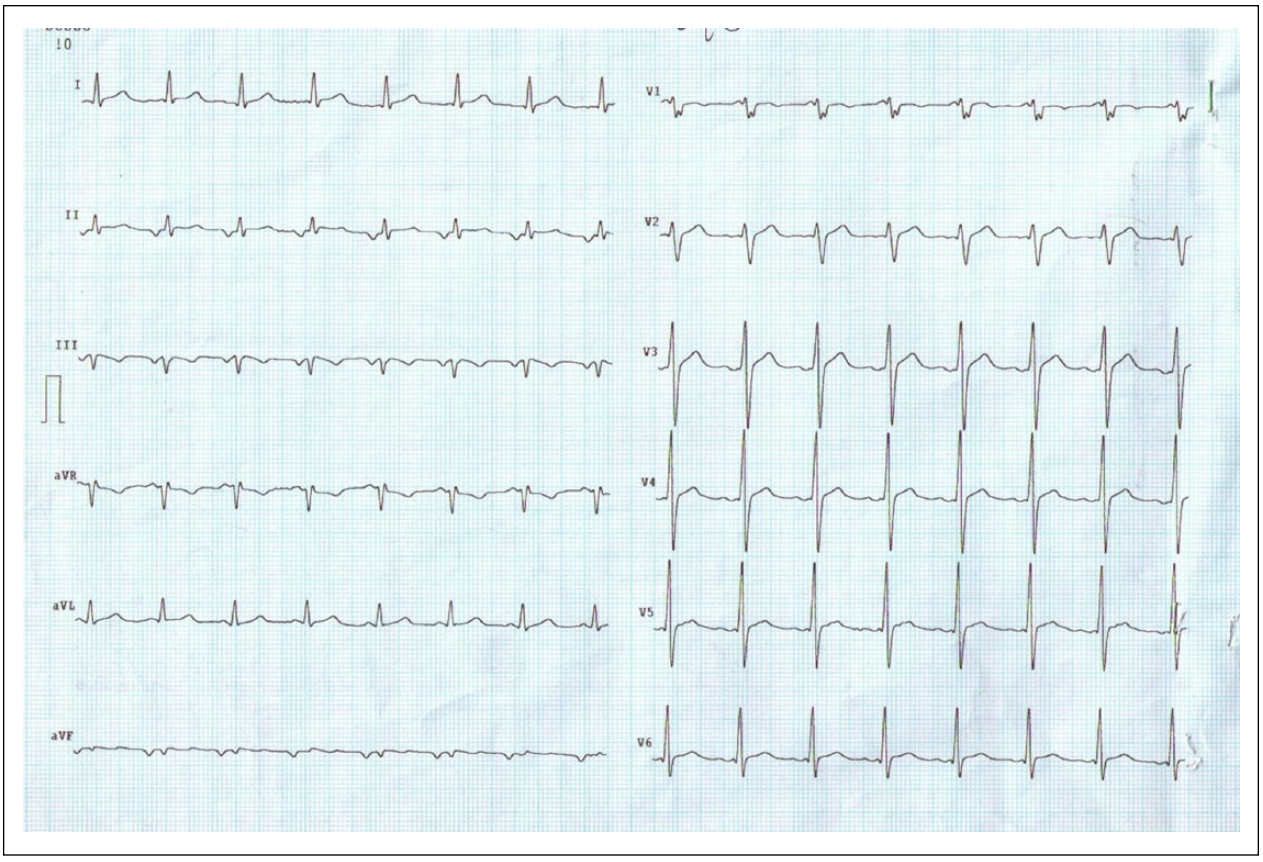

Figure 1. ECG.

normal lipid profile (high-density lipoprotein, 65 mg/dL; and low-density lipoprotein, 101 mg/dL), and normal hepatic and renal functions.

Transtoracic two-dimensional color Doppler echocardiography (TTE) revealed a diffuse hypokinesia with a marked decreased in systolic function (LVEF 35.9%, calculated with the biplane Simpson method), normal thickness of intraventricular septum (9.2 mm) and diameter of posterior wall (8.7 mm), and a high teledyastolic diameter (65 mm). Right ventricular size and morphology, as well as the function of the aortic and pulmonary valves were normal (Figure 2). The angiography showed normal coronary arteries.

Discussion

This young, active, previously healthy body builder had an acute dilated cardiomyopathy (DCM) with marked decreased systolic function. Coronary angiography revealed a normal vascularization. In the absence of demonstrable factors predisposing the patient to a DCM (familiar form of disease, infection, chemotherapeutic agents, alcohol abuse) this pathology was likely related to the patient's use of Xenadrine EFX, which contained 335 mg of *ma huang* (ephedra alkaloid) and 910 mg of guarana seed (equivalent to caffeine) per recommended dose. It was an over-the-counter dietary supplement that the patient had taken in doses that were well within the manufacturer's recommendations. The pharmacokinetics of *ma huang* have been well defined. It is well absorbed after oral administration and is excreted essentially unchanged in the urine, with a serum half-life of approximately 5 h. *Ma huang* increases the availability of catecholamines at adrenergic synapses in the brain and in the heart, directly stimulating α- and β-adrenergic receptors. As a result, the heart rate increases and the blood pressure rises secondary to elevated cardiac output and peripheral resistance. Coronary vasospasm is thought to be the underlying mechanism of myocardial infarction in patients taking *ma huang*, which has also been reported to affect the cardiac conduction system.[1] The adrenergic effects of ephedra shorten cardiac refractory periods, permitting the development of re-entrant cardiac arrhythmias. Caffeine enhances the cardiovascular and

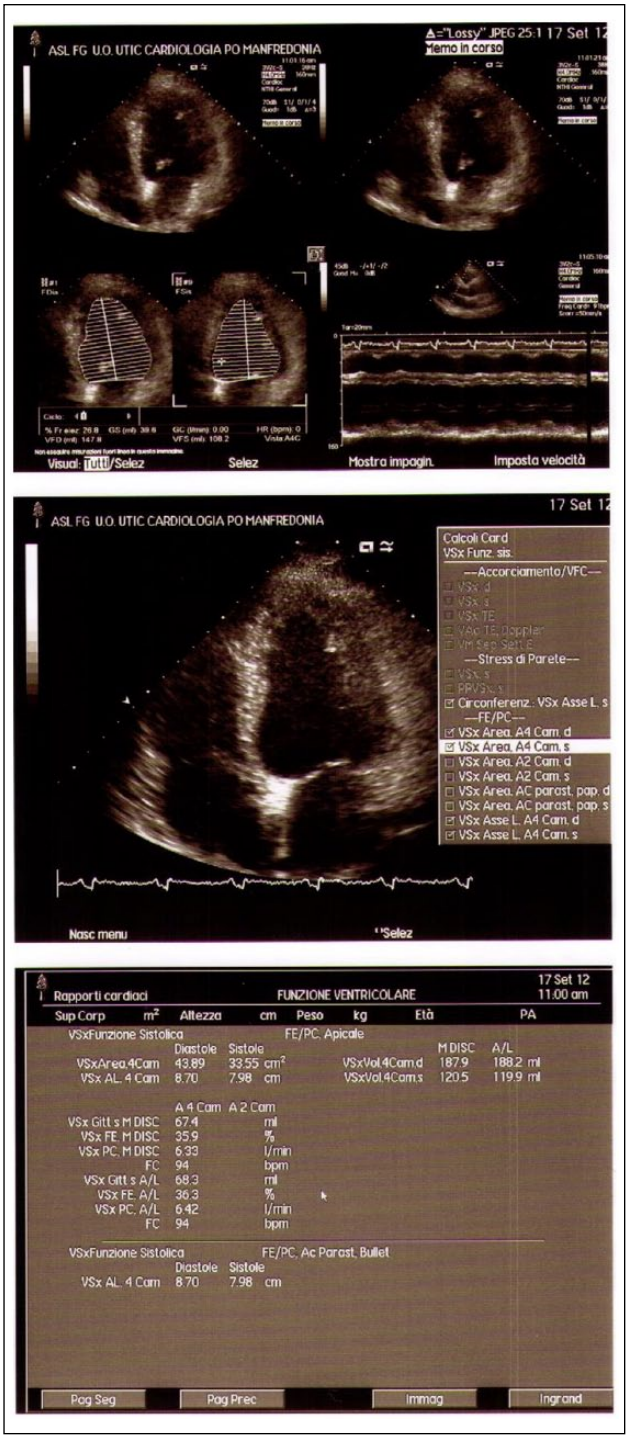

Figure 2. Transtoracic two-dimensional color Doppler echocardiography.

central nervous system effects of ephedra alkaloids through augmentation of catecholamine release. By competitively antagonizing adenosine receptors that mediate vasodilation, caffeine constricts blood vessels and can increase blood pressure, especially in persons prone to hypertension.[2]

The combined effects of caffeine and ephedra increase myocardial oxygen consumption by increasing heart rate, contractility, and peripheral resistance (afterload), while potentially diminishing coronary blood flow by increasing coronary resistance and promoting frank coronary spasm. The diminished blood flow may lead to the development of in situ thrombosis.[3]

Although there is a lack of prospective evidence regarding the effects of ephedra-containing alkaloids on platelet function, coagulation, and the fibrinolytic system, adverse embolic-related events associated with ephedra-containing herbal products have been reported.[4]

Documented cardiovascular adverse effects are hypertension, palpitations and tachycardia, sudden death, arrhythmia, myocardial infarction, coronary aneurysm and thrombosis, myocarditis, exercise-induced syncope and QT-interval prolongation, vasospasm and stroke, intracerebral hemorrhage, and vasculitis. These events can occur even in individuals without apparent underlying coronary atherosclerosis or hypercoagulable state.[5]

Declaration of conflicting interests

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