

**Methamphetamine Cardiotoxicity:
Unique Presentation with
Multiple Bi-Ventricular Thrombi**

To the Editor:

CASE PRESENTATION

A 35-year-old computer engineer presented with dyspnea and chest pain of 2 weeks duration. He had no coronary artery disease risk factors. He was a well-educated male, nonsmoker, with no history of alcohol use. There was no family history of heart disease. However, he had a long history of methamphetamine abuse for over 15 years. His examination revealed jugular venous distension, bilateral lung crackles, and pedal edema consistent with acute heart failure.

INVESTIGATIONS AND MANAGEMENT

Electrocardiogram did not reveal any ischemic changes, and serial troponins were negative, which ruled out an acute coronary syndrome. A computed tomography angiogram of the chest revealed a left-sided pulmonary embolism, and intravenous heparin was commenced. Transthoracic echocardiogram demonstrated severe global hypokinesis of both ventricles, with left ventricular ejection fraction of 23%. Multiple large masses were noted in the left (**Figure, Panel A**) and right ventricles (**Figure, Panel B**). Cardiac magnetic resonance imaging confirmed the masses as multiple thrombi in both ventricles (**Figure, Panel C**). There was no evidence of late gadolinium enhancement to suggest myocardial scarring. The intravenous heparin was later bridged to warfarin. His work-up of thrombophilia was negative. He was also commenced on optimal medical therapy including diuretics, beta-blockers, and angiotensin-converting enzyme inhibitors for left ventricular dysfunction and heart failure. Follow-up echocardiogram at 3 months revealed some reduction in ventricular thrombus burden. He was switched to a combination of fondaparinux 10 mg/day along with ticagrelor 90 mg twice daily. There

was some improvement in left ventricular ejection fraction to 30%. He has not had any further embolic events at follow-up and has discontinued drug abuse. An implantable defibrillator will need to be considered once the thrombi resolve, if significant left ventricular dysfunction persists despite optimal medical therapy.

DISCUSSION

Nonischemic cardiomyopathies secondary to drug abuse are increasingly prevalent due to widespread availability of drugs. Homelessness and foster care are well-known risk factors for methamphetamine use.¹ It is interesting to note that unlike the typical population in whom drug abuse is prevalent, our patient was a well-educated man with stable employment.

The cardiac manifestations from methamphetamine vary depending on the chronicity of use. Palpitations and cardiac arrhythmias are common manifestations, whereas hypertension is widely reported due to increased sympathetic activity. Acute coronary syndrome and sudden cardiac death can occur. The mechanism for cardiac dysfunction is thought to be related to vasospastic and ischemic changes, direct toxicity from methamphetamine, and direct sympathetic effects of catecholamines in the myocytes.² Chronic methamphetamine-induced ischemia leads to myocardial fibrosis and dilated cardiomyopathy. Our patient did not have any myocardial scar on cardiac magnetic resonance imaging, and hence, there is potential for further improvement in cardiac function. His family members were screened and there was no evidence of a familial dilated cardiomyopathy. Methamphetamine-associated cardiomyopathy can be reversible.³ Management includes discontinuing the offending drug and use of drugs that modify neurohumoral system.

Although methamphetamine is reported to be associated with small and medium-sized vessel thrombosis, to the best of our knowledge, this is the first case of methamphetamine cardiotoxicity presenting with acute pulmonary embolism and multiple, bi-ventricular thrombi.

Funding: None.

Conflict of interest: None.

Authorship: Both authors had access to the data and played a role in writing the manuscript.

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<http://dx.doi.org/10.1016/j.amjmed.2015.08.006>

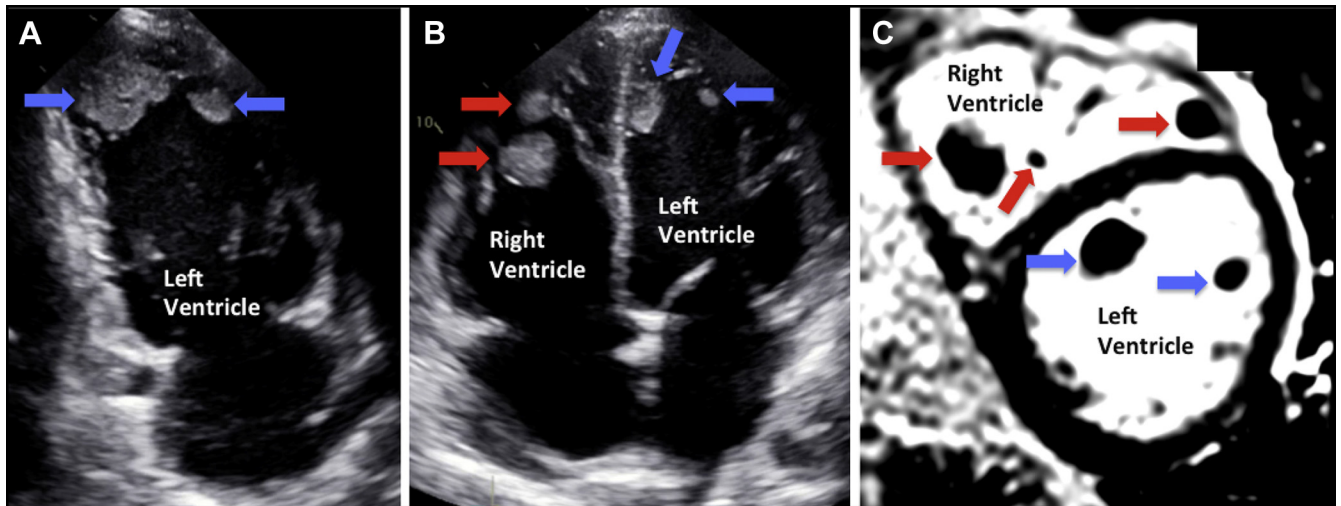


Figure Panels A and B: Transthoracic echocardiogram images. (A) Apical 2-chamber view shows multiple large thrombi in the left ventricle. (B) Apical 4-chamber view shows multiple large thrombi in the left and right ventricle. (C) Cardiac magnetic resonance imaging contrast-enhanced image confirms the nonenhancing masses as multiple thrombi in both ventricles.

References

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