Methamphetamine-Induced Cardiotoxicity with Heart Failure in a Young Adult: A Case Report and Literature Review

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Methamphetamines are widely used illegal stimulants among young adults. Patients who abuse methamphetamines are likely to deny a history of drug abuse in a hospital setting, making it difficult to establish a diagnosis when patients present to the emergency department with drug-related symptoms. Herein, we present a young adult with severe heart failure related to methamphetamine abuse.

Key words: methamphetamine, young adult, heart failure

Introduction

Methamphetamines (MAPs) are widely used illegal stimulants among young adults. Abuse of MAPs has increased rapidly worldwide and has become a significant health care and legal issue. Although cardiotoxicity (cardiomyopathy, acute coronary syndrome, arrhythmia, and heart failure) after long-term use of MAPs has been documented⁴, it is difficult to establish a diagnosis when patients present to the emergency department with symptoms and signs of cardiotoxicity due to MAPs. Here, we present a case of severe heart failure due to abuse of MAPs.

Case Report

A previously healthy 28-year-old man without identifiable cardiac risk factors presented to a hospital elsewhere with a one-month history of cough and exertional dyspnea. A diagnosis of acute bronchitis was made. However, his symptoms progressed combined with edema of both lower legs. Therefore, the patient sought help at our emergency department. His vital signs were unremarkable with the exception of increased respiratory rate (25 breaths per min). Chest auscultation revealed mild basal crackles without heart murmur and both lower legs showed grade 2 pitting edema. His laboratory data were within normal limits with the exception of troponin I (0.12 ng/ml; normal range, 0-0.04 ng/ml). Chest X-ray revealed cardiomegaly with mild pulmonary congestion and blunting of the right cardiopulmonary angle (Fig. 1) and the ECG showed left atrial enlargement, poor R-wave progression, and left ventricle hypertrophy with strain (Fig. 2). Cardiac echography demonstrated a dilated left atrium and generalized hypokinesia of the left ventricle (LVEF: 15%). He denied any drug abuse initially, but later confessed...
to smoking MAP about 2-3 times a week for more than 1 year. He was admitted to the cardiology ward under the impression of dilated cardiomyopathy with heart failure. Cardiac catheterization showed a patent coronary artery without significant occlusion. He was discharged on the ninth day of hospitalization under stable condition after receiving a course of diuretics and inotropic agents.

**Discussion**

MAPs differ from amphetamines and are commonly abused by young adults around the world. The overall prevalence of amphetamine and methamphetamine abuse is about 0.5% worldwide and 0.6% in Taiwan. Amphetamine was first synthesized in the 1920s and introduced into medical practice to treat obesity and attention...
deficit hyperactivity disorder in 1936. Amphetamine causes the direct release of stored catecholamines from the presynaptic membrane and also functions as a weak inhibitor of monoamine oxidase, the enzyme that functions to catalyze the oxidation of neurotransmitter molecules such as norepinephrine and dopamine⁵.

Although uncommon, cardiomyopathy has been documented in patients with a history of abuse of oral, intravenous, or smoked forms of methamphetamines⁶⁻⁸. Pathologic findings of amphetamine-induced cardiomyopathy often reveal a dilated ventricle and atria with spotted fibrosis⁹, which can result in heart failure, although there is no significant change in the coronary artery⁷. MAP abusers have a more severe form of dilated cardiomyopathy as compared to non-abusers among patients with non-ischemic, non-valvular cardiomyopathy¹⁰. Furthermore, increased platelet aggregation due to catecholamines are believed to be responsible for coronary vasospasm¹¹.

Amphetamine and methamphetamine abusers commonly deny a history of drug abuse in hospital settings. Often these patients are thought to have an idiopathic form of cardiomyopathy, leaving out MAP abuse as the cause. Werner et al. reported 6 cases of fatal amphetamine-associated cardiotoxicity in young adults, in whom two lethal cases presented prior to arrival at the emergency department with palpation or pain in the left arm, symptoms typically associated with cardiac pathology¹². Unfortunately, their symptoms are often considered trivial or musculoskeletal in origin due to their young age. Therefore, cardiomyopathy due to amphetamine or methamphetamine abuse should be recognized as a potential fatal diagnosis.

References

一位年輕病患因甲基安非他命的心臟毒性引起的
心臟衰竭：病例及文獻回顧

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甲基安非他命常見於年輕人藥物濫用，長期使用會造成心臟病變而以心臟衰竭症狀表現。此類病人
於就診時，常隱瞞用藥事實而使臨床醫師在診斷上方向錯誤。如年輕病人於就診時出現心臟衰竭症狀而
與年紀不符時，要小心病人可能是藥物濫用引起的心臟疾病。

關鍵詞：甲基安非他命，年輕病患，心臟衰竭