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CASE REPORT

Acute ascending aortic dissection after MDMA/ecstasy use: A case report

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Abstract Acute aortic dissection is rare among young patients in the absence of connective tissue disorders. One of the risk factors associated with aortic dissection among young patients is amphetamine use. We report a case of a 37-year-old female with a past medical history of hypertension presenting with syncope and altered mental status who was found to have an acute DeBakey Type I aortic dissection after ingestion of 3,4-methylenedioxymethamphetamine (MDMA), commonly known as ecstasy. This is the second case in the literature describing aortic dissection in relation to MDMA use. In both cases, the patients were young and had no history of connective tissue disorders or underlying valvular abnormalities. In this case, echocardiography was used to establish the diagnosis early. A transthoracic echocardiogram revealed a possible dissection flap prolapsing in through a normal aortic valve. Subsequently, a transesophageal echocardiogram revealed wide-open aortic regurgitation with several proximal dissection flaps from a normal caliber ascending aorta prolapsing into a normal tricuspid aortic valve. A high index of suspicion is necessary to diagnose and treat aortic dissection in young patients with a history of MDMA use.
Learning Objective: Recognize MDMA as a risk factor for acute aortic dissection, especially among younger patients with whom clinicians may not often associate aortic dissection.

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1. Introduction

Amphetamine use among patients 18—49 years of age has increased in overall incidence from 1995 to 2007.[1] A national population-based case control study of over 3 million patients ages 18 to 49 found that those who used amphetamines have a 3-fold increase in risk of developing aortic dissection. There is a stronger association of amphetamine use and risk of developing aortic dissection compared to those with a history of cocaine use.[1] While aortic dissection is typically seen in the older population (persons in their sixties), patients with a history of amphetamine use may present at an earlier age.[2,3] Swalwell et al. analyzed 84 autopsies after aortic dissection and found that the average age of patients who tested positive for methamphetamines was 41 years old compared to the overall average age of 52 years.[3]

3,4-Methylenedioxymethamphetamine (MDMA), commonly known as ecstasy, is a synthetic amphetamine popular among young adults. Although amphetamines as a class have been shown to be a risk factor for aortic dissection, there has been only one reported case of aortic dissection occurring after the ingestion of MDMA in the literature.[4] Compared to other amphetamines, MDMA may be used by a much younger population. The National Institute of Health has reported that in 2008, 4.3% of 12th grade students and 1.7% of 8th grade students admitted to having used MDMA.[5] Here, we report a case of a young female patient who presented with acute aortic dissection shortly after the use of MDMA with echocardiograms showing significant aortic regurgitation from prolapse of the dissection flap into the aortic valve.

2. Case Report

A 37-year-old African American female with a history of hypertension was brought to the hospital for syncope and altered mental status approximately 3 hours after taking Ecstasy/MDMA. The patient arrived with a GCS of 8, blood pressure of 89/59 mmHg, and heart rate of 108. The physical exam was remarkable for a faint diastolic murmur heard over the left sternal border. Otherwise, she was able to move all extremities spontaneously. The patient's labs were remarkable for mildly elevated troponin and the urine drug screen was positive for amphetamines. The electrocardiogram showed minimal ST depressions and T wave inversions in the inferolateral leads. The chest X-ray showed a moderately widened mediastinum (Fig. 1). An emergent transthoracic echocardiogram ordered to rule out acute coronary syndrome revealed a severe depressed ejection fraction (20—25%) with no notable regional wall motion abnormalities. It also showed a possible proximal aortic dissection prolapsing in a trileaflet aortic valve leading to wide-open aortic regurgitation. The rest of the proximal ascending aorta and extent of the flap were not well visualized. Therefore, a transesophageal echocardiogram was performed which revealed wide-open aortic regurgitation with several proximal dissection flaps from a normal caliber ascending aorta prolapsing into a normal tricuspid aortic valve (Fig. 2A and 2B). CT angiography performed in preparation for surgical intervention confirmed DeBakey

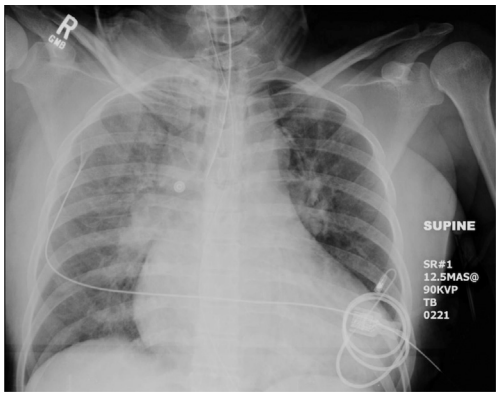

Fig. 1 Chest X-ray showing widened mediastinum and pulmonary congestion.

Type I aortic dissection extending into the brachiocephalic artery and proximal descending thoracic aorta (Fig. 3). The patient developed bradycardia and atrioventricular (AV) block suggestive of myocardial ischemia resulting from reduced right coronary perfusion, with the eventual development of complete heart block. She remained severely hypotensive despite vasopressors, developed pulseless electric activity, and expired after prolonged CPR. The patient had no family history of vascular diseases or clinical features of connective tissue disorders. This is the second reported case in the literature of acute aortic dissection occurring after use of MDMA/Ecstasy. New onset aortic regurgitation can be a presenting sign of aortic dissection, where dissection intimal flap may prolapse into the left ventricular outflow tract.

3. Discussion

Aortic dissection occurs when the intimal layer tears due to sudden shear stress. Factors that weaken the aortic wall, such as chronic hypertension, connective tissue disease and atherosclerosis, predispose the tear to occur.[6] MDMA, like other types of stimulants, causes an acute increase in blood pressure, which may weaken the aortic wall over time. Furthermore, the acute rise in blood pressure following MDMA ingestion may trigger tearing of the intimal layer, initiating the onset of acute aortic dissection.

This is the second case reporting the development of aortic dissection following MDMA use. The previously reported case also occurred in a young patient, a 29-year-old male with no other risk factors.[4] The two cases are similar in that both occurred in patients who are much younger than the average age of patients with aortic dissection, which is approximately 63 years old.[2]

Drug-related aortic dissection may not necessarily occur while the patient is intoxicated by the drug, but it may present itself hours after the ingestion of the drug. In a case series of cocaine users who developed acute aortic dissection, the mean time interval between cocaine use and the onset of aortic dissection symptoms was 12 hours, with a range of 0—24 hours.[7] The patient in this case report presented with syncope and acute altered mental status approximately 4—5 hours following ingestion of MDMA. The previously described case presented the morning after the

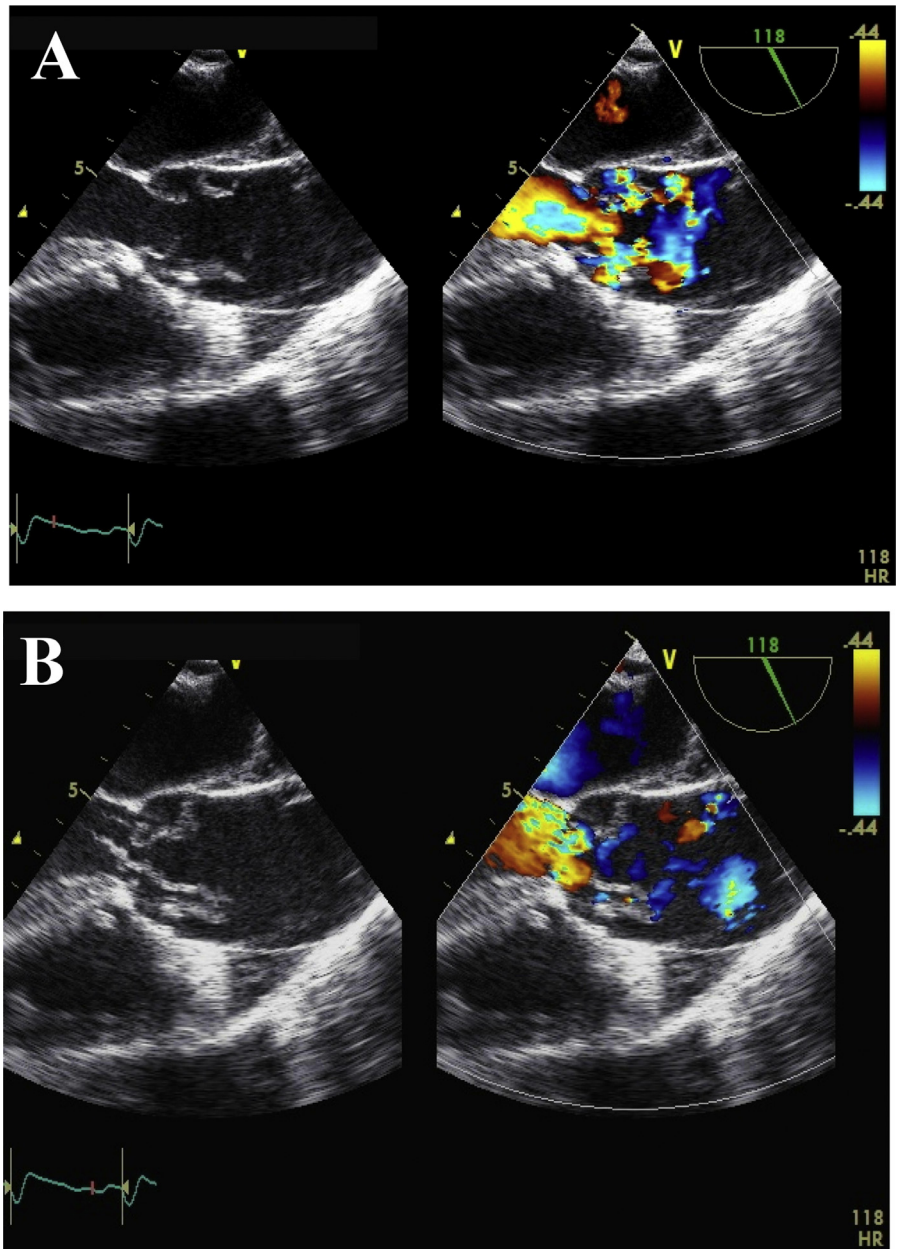

Fig. 2 Transesophageal echocardiography: (A) aortic root and left ventricular outflow tract in systole, showing dissection flaps, (B) aortic valve in diastole, showing the intimal flap prolapsing across the aortic valve into the LVOT with wide-open aortic regurgitation.

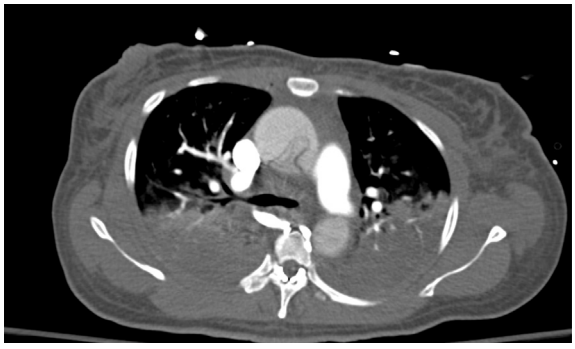

Fig. 3 Chest CT showing ascending aortic dissection with false lumen and bilateral pleural effusion.

patient ingested MDMA.[4] As some time may have elapsed since their drug ingestion, patients may not associate the symptoms of aortic dissection with drug consumption, and may not volunteer the drug use history unless specifically asked. Therefore, it is important for clinicians to inquire about recent drug use when evaluating patients presenting with possible aortic dissection.

Drug-related aortic dissection may be more common than clinicians realize. As many as 50 million people now use amphetamines worldwide, and amphetamine use has increased over the past decade.[1,5] Cocaine, which has similar adrenergic effects as amphetamines, has been associated with as high as a third of the aortic dissection cases.[7] Furthermore, another study by Westover et al.

found that amphetamines had a stronger association with aortic dissection than cocaine use.[1] It is difficult to estimate the prevalence of aortic dissections specifically from MDMA, as most laboratories test for amphetamines and do not perform further tests to differentiate between the subtypes of amphetamines. Further studies are necessary to evaluate the impact of MDMA on aortic dissection.

One of the challenges of managing aortic dissection is the wide variation in presenting symptoms. Syncope is a presenting symptom in approximately 20% of the patients with proximal aortic dissection and is associated with increased incidence of complications such as stroke and cardiac tamponade.[8] Our patient had proximal aortic dissection with extension of the dissection to the right brachiocephalic artery, but did not have evidence of a stroke or cardiac tamponade. Similarly, Nallamothu et al. found that among 96 patients with aortic dissection who presented with syncope, about half of the patients did not have a stroke or cardiac tamponade to explain their presentation.[8] They speculate that syncope may occur as a result of vasovagal reaction from the painful stimuli from the dissection, or from the stretching of the baroreceptors on the aortic walls. Although chest pain on presentation is present in most cases of aortic dissections, our patient did not present with chest pain. A Japanese study by Imamura et al. found that in their series of 98 patients with acute aortic dissection, 17% presented with painless aortic dissection, and it was associated with syncope and altered mental status on presentation.[9] Those who presented without pain were often initially misdiagnosed, experienced delay in medical care and had worse overall prognosis. In particular, for patients with a history of drug ingestion, altered mental status may be mistaken for having those symptoms secondary to the drug effect. EKG and laboratory studies may also be misleading, delaying the diagnosis of the patients. Our patient presented with elevated troponins and acute onset of aortic regurgitation, which initially raised the concern for acute myocardial infarction. Bedside echocardiograms were helpful in differentiating the conditions and lead to the appropriate diagnosis. Aortic regurgitation is found in up to 70% of patients presenting with proximal aortic dissection, but the symptoms may mimic other conditions if not recognized as a possible presenting symptom of aortic dissection.[10]

4. Conclusions

This case is an unfortunate case of acute ascending aortic dissection in a young patient following MDMA use. Although aortic dissection is rare even among those who use amphetamines, taking a thorough social history regarding drug abuse may help form the differential diagnosis and direct physicians to consider the appropriate diagnostic testing and treatment. In this case, aortic dissection resulted in aortic regurgitation secondary to prolapse of the dissection flaps into the aortic valve. Acute aortic dissection continues to be associated with high mortality. Early surgical intervention remains vital to improving patients' outcomes. In this case, echocardiography led to early diagnosis. A high index of suspicion is necessary to identify patients who are at risk for acute aortic dissection, which may include young patients with a history of MDMA use.

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