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Aortic Dissection After Ingestion of "Ecstasy" (MDMA)

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The authors report a case of aortic dissection and cardiac tamponade in a 29-year-old man after ingestion of ecstasy (methylenedioxymethamphetamine, MDMA) at a "rave" party. There was no history of hypertension, myxoid heart disease, or other risk factors for aortic dissection in the deceased, although a minor degree of cystic medial necrosis was noted on histologic examination of the aorta. Autopsy toxicology revealed low residual levels of MDMA in the blood about 48 hours after ingestion of the drug. This case report describes a probable association between MDMA ingestion and aortic dissection in a previously well young adult. The likely mechanisms are discussed, and the difficulties in diagnosing this complication are highlighted.

Key Words: 3,4-Methylenedioxymethamphetamine—MDMA—Aortic dissection—Toxicology.

Ecstasy, the common name for 3,4-methylenedioxymethamphetamine (MDMA), is a synthetic amphetamine derivative and is frequently used as an illicit drug. MDMA acts by promoting the release of serotonin and blocking the reuptake of serotonin, and to a lesser extent dopamine and norepinephrine (1). Behavioral effects of the drug are complex, but include a feeling of well-being, heightened sensory awareness, a sense of closeness with others, perceptiveness, euphoria, and an increase in the level of confidence (2). The physiologic effects of MDMA are similarly legion, and can be broadly categorized as sympathetic arousal with raised blood pressure, tachycardia and tremor, and idiosyncratic, manifesting as conditions such as hyperpyrexia, disseminated intravascular coagulopathy, cerebral venous sinus thrombosis, acute renal failure, and hepatic toxicity (3–6). When taken in combination with other psychotropic drugs, an exaggerated sympathetic response can be observed (7). Additionally, ingestion of MDMA can result in the inappropriate release of vasopressin, with resultant water toxicity, hyponatremia, and massive cerebral edema (8).

Despite these complex and wide-ranging reported side effects of MDMA, the drug is reputed to be safe among users, and few deaths have been directly attributed to the drug. MDMA is a drug of choice at "rave" parties, and recent reports from Australia, the United States, and Great Britain reveal a very high incidence of ingestion of the drug in the nightclub scene (9–11).

We report a patient who died 48 hours after ingestion of MDMA while attending a "rave" party.

CASE REPORT

A 29-year-old man took an ecstasy (methylenedioxymethamphetamine, MDMA) tablet and a large quantity of alcohol while attending a "rave" party. He apparently experienced no undesired effects of the drug during the party, returning home

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later that day. He slept until the following morning, and was noted to be in good health by a friend until he suddenly collapsed to the floor about 2 hours after waking. He was taken to his general practitioner, who referred him to the local hospital. On arrival at the hospital, about 36 hours after taking ecstasy, the patient complained of shortness of breath, abdominal pain, diarrhea, and vomiting. On examination, he was afebrile and normotensive. No localizing thoracic or abdominal signs were identified. Apart from a white blood cell count of 17,800/ml, biochemical and hematologic investigations were within normal limits. While in the emergency unit, he passed a bloody, loose bowel movement, but refused further investigation. A diagnosis of gastroenteritis was made, and the patient was discharged about 2 hours later. He was readmitted 8 hours later after a further sudden deterioration in his condition. At this stage, the patient's blood pressure was 180/105 mm Hg, and his temperature was 39°C. The patient appeared severely ill, and continued to deteriorate. Despite extensive resuscitation, he died about 5 hours after his final admission to hospital and about 48 hours after ingesting the ecstasy tablet. No definitive diagnosis was made, and the death was referred to the coroner for investigation and autopsy.

AUTOPSY AND HISTOLOGIC FINDINGS

At autopsy, there was a Type I dissection of the aorta, commencing at the root of the aorta and continuing to its bifurcation (Fig. 1). This dissection had resulted in cardiac tamponade, with 300 ml blood in the pericardial cavity. In addition, the dissection had involved the origins of both the superior and inferior mesenteric arteries, with resultant bowel ischemia. The patient showed evidence of septicemia, with softening of the spleen and rapid decomposition of organs. Microscopy of the aorta at the site of the dissection revealed a minor degree of cystic medial necrosis, but no other evidence of predisposition to spontaneous aortic dissection. Specifically, there was no evidence of hypertension, atherosclerosis, valvular heart disease, myxoid heart disease, or other conditions associated with dissection of the aorta (12). The aortic ring was of normal appearance, and there were no systemic or cardiovascular features of Marfan's syndrome. Septicemia was confirmed histologically, but decompositional changes precluded further assessment of the bowel pathology.

TOXICOLOGIC FINDINGS

Toxicologic analysis of both postmortem blood and blood taken shortly before the death of the patient revealed an MDMA concentration of 0.1 mg/L. No other drugs or toxins were detected—specifically, no other amphetamines or cocaine were identified. At the time of autopsy, no alcohol was detected in blood.

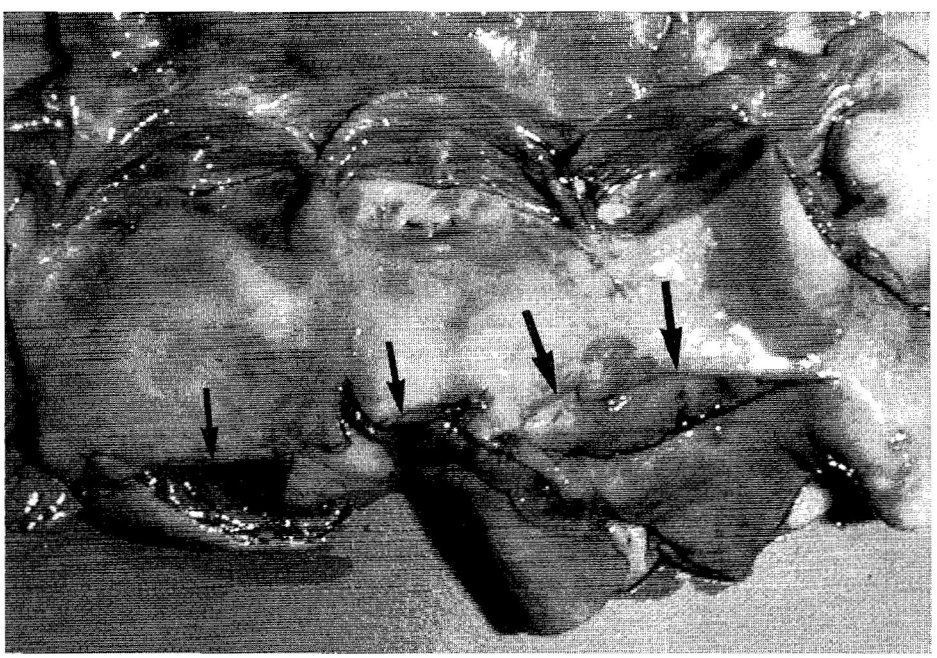

FIG. 1. Macroscopic appearances of site of aortic dissection. Arrows indicate site of commencement of aortic dissection at the root of the aorta.

DISCUSSION

Hypertension is a well-known complication of MDMA ingestion (13). Severe increases in blood pressure have been described at typical recreational dose levels, and higher or repeat amounts have the potential to lead to severe hypertensive reactions (3). Although the deceased had a degree of previously unsuspected mild cystic medial necrosis of the aorta, without an episode of severe hypertension it is most unlikely the vessel would have dissected. This patient presented with acute-onset diarrhea, vomiting, and abdominal pain in association with hypertension. The most likely explanation for this is that dissection of the aorta had commenced at the time of initial presentation, resulting in inadequate mesenteric arterial perfusion and bowel ischemia. His later deterioration is probably the result of the dissection extending into the pericardial sac. This is a not uncommon presentation of aortic dissection, and can be difficult to diagnose during life, especially in a young patient, where aortic dissection is rare.

Aortic dissection after amphetamine (14) and cocaine ingestion (15) has been reported previously. To our knowledge, this is the first report of aortic dissection after ingestion of ecstasy (MDMA). Whether the previously undiagnosed cystic medial necrosis of the aorta contributed significantly to the formation of the dissection is open to speculation, although investigators have not shown a strong association between cystic medial necrosis and Type I dissection of the aorta (12,16).

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