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THORACIC AORTIC DISSECTION ASSOCIATED WITH MARIJUANA USE

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☐ **Abstract—Background: Acute aortic dissection (AD) is a life-threatening condition most frequently seen in men with an average age >60 years. Risk factors include family history, hypertension and cigarette smoking. AD has been associated with methamphetamine and cocaine use but has not previously been associated with the use of marijuana. Case Report: We report a case of an aortic dissection in a 56-year-old male that occurred while smoking marijuana. The patient had a family history significant for both aortic aneurysm and dissection. He developed crushing chest pain, shortness of breath, and diaphoresis shortly after smoking marijuana from a glass pipe called a "bubbler". His ECG was unremarkable as was his chest x-ray and initial labs. CT scan revealed an Aortic dissection from the aortic root to the internal iliac artery. Why Should an Emergency Physician Be Aware of This?: The role of cannabis in cardiovascular disorders is complex and not completely understood. Acute chest pain associated with marijuana use typically raises concern for pneumothorax or pneumomediastinum. Marijuana has also been associated with hypertension and arrhythmias and has also been associated with an increased risk of myocardial infarction. However a link between marijuana and acute aortic dissection has not been previously reported. As more states legalize medical and recreational marijuana use this is a timely and important consideration for Emergency physicians evaluating chest pain. Our goal is to document the temporal relationship of cannabis use and acute aortic dissection in a recent ED patient.** © 2019 Published by Elsevier Inc.

☐ **Keywords—aortic dissection; THC; marijuana; cannabis; illicit drug use**

INTRODUCTION

According to recent epidemiological studies, the incidence of acute aortic dissection (AD) is approximately 2–3.5 cases per 100,000 person-years, which equates to 6000–10,000 domestic cases per year (1). The International Registry of Aortic Dissections reports a male predominance (65%) and mean age at presentation of 63 years (2). Hypertension (approximately 75% of patients) and atherosclerosis are commonly associated with the development of AD; family history of aortic dissection is also a risk for dissection < 60 years, as is Marfan disease (1,3–5). Current research shows that AD "displays a familial clustering in greater than twenty percent of all documented cases," and those with a family history have a six- to 20-fold increased risk of developing a similar life-threatening cardiac event. Fifteen to thirty percent of patients with an aortic aneurysm or dissection will have a positive family history for a similar diagnosis (3). Patients with genetic connective tissue disorders such as Marfan or Ehler-Danlos syndrome, and patients with bicuspid aortic valves are at an increased risk of aortic dissection at a much younger age. These conditions have associated defects that affect the integrity of the aortic wall, which increases the risk of aneurysmal dilatation and dissection (6).

There have been previous reports of AD associated with cocaine use, but it usually affects the descending

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aorta and is generally seen in young, black, hypertensive patients. The pathophysiology is postulated to be from premature atherosclerosis, which weakens the aortic wall, coupled with the sympathetic stimulation of cocaine use (5). Methamphetamine use is also a known risk factor for AD (7). The toxins in cigarettes are known to function on the cellular level via inflammatory markers to cause vascular tissue dysfunction; however, this has not been shown to be true for cannabis (8). Emergency physicians typically include a recreational drug history in the acute chest pain patient, but concomitant marijuana use more commonly raises concern primarily for pneumomediastinum and pneumothorax (9).

CASE REPORT

A 56-year-old Caucasian man presented to an urgent care facility at 9:37 AM after experiencing sudden-onset crushing chest pain (8/10 scale), shortness of breath, and diaphoresis. He said he had been using a "bowl" (small glass pipe) to smoke marijuana when this happened. As he was inhaling deeply, he started to feel a tearing sensation in his chest, and then became diaphoretic and short of breath several minutes later. He took 650 mg acetylsalicylic acid and drove himself to the urgent care facility. Past medical history included gout, tobacco abuse, and daily marijuana use. Family history included coronary artery disease and aortic dissection in his father, who died suddenly at the age of 46 years, a brother (58 years old) with a 4.5-cm aortic aneurysm, and two sisters (53 and 60 years old) with a 5-cm ascending thoracic aneurysm and a 3-cm descending thoracic aneurysm, respectively. On examination he was noted to be pale, anxious, and diaphoretic. Urgent Care vitals revealed a heart rate (HR) of 47 beats/min, blood pressure (BP) of 177/80 mm Hg, temperature of 35°C (96°F), respiratory rate (RR) of 16 breaths/min, and an oxygen saturation of 100% on room air (RA). His pulses were normal and symmetric and he had a normal neurologic examination. Electrocardiogram was significant only for sinus bradycardia. He was given sublingual nitroglycerin, with moderate improvement in symptoms, and transferred to the Emergency Department (ED) via Advanced Life Support transport at 10:05 AM. His chest pain returned during the transport.

The ED resident had seen him and was placing orders by 10:33 AM. ED vitals were as follows: HR of 41 beats/min, BP of 138/65 mm Hg, temperature of 36.5°C (97.8°F), RR of 18 breaths/min, and oxygen saturation of 100% on RA. He was diaphoretic and in mild distress; his examination was otherwise unremarkable. Electrocardiogram again demonstrated sinus bradycardia without ST-elevation myocardial infarction or other changes indicative of ischemia. He received 2 doses of morphine and 2 sublingual nitroglycerin tablets for his chest pain, with improvement of the pain to a 3/10. Laboratory results were unremarkable, including a negative troponin I. A toxicology screen was not performed. Posteroanterior and lateral chest x-ray study did not reveal any findings consistent with aortic dissection. Computed tomography revealed a type A aortic dissection extending from the aortic root to the left common iliac (See Figures 1 and 2). His computed tomography results were reported at 11:50 AM, but the images had been viewed contemporaneously, and Cardiothoracic Surgery was at the bedside at 12:06 PM. Nicardipine and metoprolol were initiated in the ED. The patient was taken to the operating room for repair at 12:44 PM. The surgeons utilized a sternotomy approach to repair his ascending aorta with a 34-mm Dacron interposition graft. He was found to have a normal three-cusp aortic valve. The patient did well postoperatively and was discharged home 6 days later.

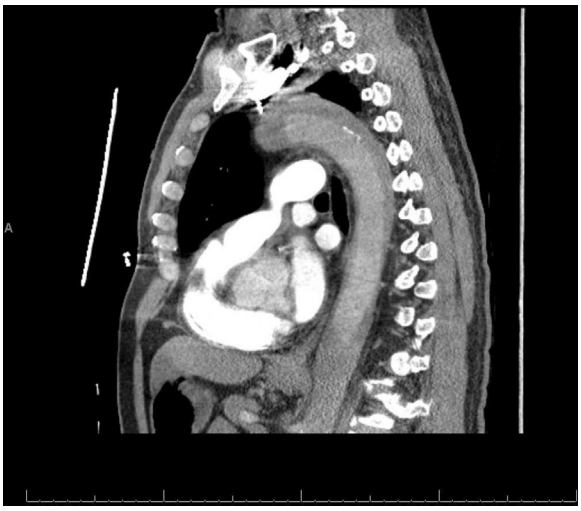

Figure 1. Sagittal CT scan demonstrating aortic dissection.

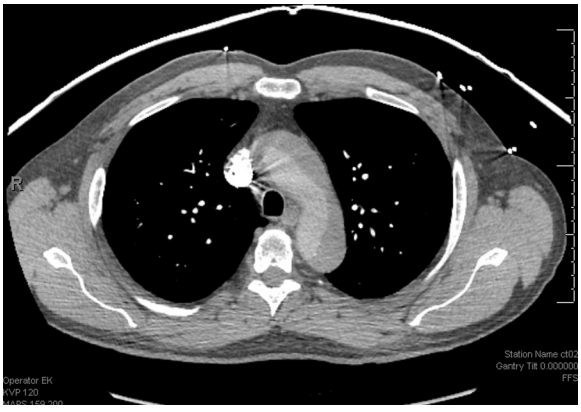

Figure 2. Axial CT scan demonstrating aortic dissection.

DISCUSSION

In the setting of chest pain and cocaine use, emergency physicians have long known of the increased risk of coronary artery disease (10). However, to our knowledge, acute onset of AD from inhalational use of marijuana has not previously been reported. As more states legalize the use of marijuana, the increase in the number of potential users makes this a timely consideration in the chest pain work-up (11). A recent literature review found evidence of cannabis use associated with an increased risk of myocardial infarction and ischemic stroke in young people (7). Ramesh et al. report an increase in heart rate in a double-blind study of marijuana users (12). Likely because marijuana users often utilize a Valsalva maneuver to maximize the drug's effect, its use also has been associated with pneumomediastinum and pneumothorax (9). Coughing, sneezing, and other Valsalva maneuvers not only increase intrathoracic pressure, but also alter systemic hemodynamics. First, the arterial pressure increases with a rise in intrapleural pressure, and then drops after a decrease in pleural pressure and venous tone (13). Baydin et al. report a case of an aortic dissection after a sneeze (14). Acute cannabis use has been associated with an increase in systolic blood pressure, and a recent review speculated that because cannabis may increase heart rate, blood pressure, and pulse pressure, it may place an acute stress on the aortic wall, increasing the risk of AD (8,15). It is also possible that our patient consumed marijuana laced with stimulatory co-ingestants or took them separately.

WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?

Although no single case can establish causality, it should raise the question for emergency practitioners when presented with patients reporting chest pain after inhalational marijuana use, especially in those with other risk factors associated with aortic dissection.

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