

Case Report

Type a aortic dissection and cocaine use

Jarrah Alfadhli, MD^{1*}, Loulwa Alsharhan, MD², Sibi Krishnamurthy, MD¹ and Claudia Martinez, MD³¹Department of Medicine, University of Miami Miller School of Medicine, Miami, Florida, USA²Department of Nephrology, Boston University, Massachusetts, USA³Cardiovascular Division, University of Miami Miller School of Medicine, Miami, Florida, USA***Corresponding author****Jarrah Alfadhli**Department of Medicine
University of Miami Miller
School of Medicine

Miami, Florida, USA

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BACKGROUND

Aortic dissection is an uncommon presentation of acute cocaine intoxication. The International Registry of Acute Aortic Dissection (IRAD) only documented 63 instances of cocaine-associated aortic dissection among 3584 cases (1.8%) between 1996 and 2012.^{1,2} Chest pain after cocaine use has instead been more commonly associated with vasospasm and acute coronary syndromes. Risk factors for cocaine-associated aortic dissection include young age, black ethnicity, untreated hypertension, and left ventricular hypertrophy.³ Failure to consider aortic dissection in the initial evaluation of patients with chest pain and recent cocaine use has led to adverse events, including major bleeds and fatalities.⁴ We report a case of cocaine-associated acute type A aortic dissection.

CASE

A 50 year old black male with history of essential hypertension and cocaine use presented to a tertiary care hospital ER with tearing chest pain and transient paresis of both lower extremities twelve hours after cocaine use. His first blood pressure reading was 113/88, which gradually increased to a peak of 168/124 a few hours later. The initial electrocardiogram did not show any ST segment changes, but a chest x-ray showed a widened mediastinum. The chemistry panel showed evidence of acute kidney injury, the troponin T level was within normal limits, and a toxicology screen was positive for cocaine metabolites. A computed tomography (CT) angiography of the chest, abdomen, and pelvis showed an extensive type A aortic dissection, starting from the aortic root and extending distally to the thoracic and abdominal aorta, creating a false lumen in the right renal artery with decreased enhancement of the right kidney (Figures 1, 2 and 3). The dissection involved bilateral common iliac, femoral, and profunda femoris arteries. It also showed expansion of the dissection into the great vessels of the chest with significant decreased opacification in the right subclavian, proximal right vertebral, left common carotid, and left subclavian arteries.

The patient was taken emergently to the operating room for surgical repair of the dissection. Intraoperatively, a large intimal tear was found in the midaspect of the ascending aorta with the false lumen reaching the level of the aortic annulus, and the flap dissection was found near the ostia of the left main and right coronary arteries. The aortic valve was preserved. The patient underwent successful reconstruction of the aortic root with Teflon reinforcement, and the layers of the descending aorta were sutured together. The patient was then transferred to the surgical ICU and started on beta blockers to control both the heart rate and blood pressure. Initially, the patient's renal function worsened over the first few days, but it later recovered spontaneously. The patient was discharged to a rehabilitation center after ten days of inpatient care.

DISCUSSION

Cocaine toxicity is a rare cause of an uncommon pathology. Our patient had a very extensive type A aortic dissection shortly after cocaine use. The differential diagnosis for cocaine users presenting with acute chest pain is more commonly centered around severe coronary vasospasms resulting in acute myocardial ischemia.⁵ However, it is important to consider other serious life-



Figure 1: Still frame image of a Computed Tomography scan of the chest with 3D reconstruction demonstrating a tortuous thoracic aorta showing an intimal flap (blue arrow) extending from the ascending aorta through the arch and down the descending thoracic aorta.

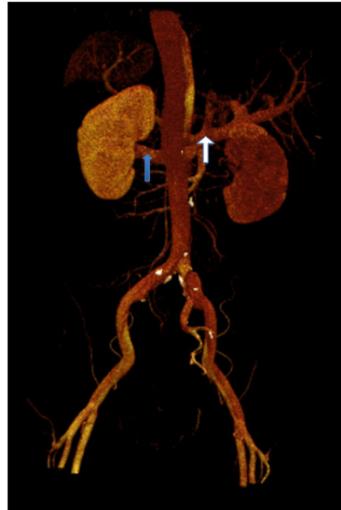


Figure 2: Still frame image of a Computed Tomography scan of the abdominal aorta with 3D reconstruction demonstrating an abdominal aorta dissection extending to the left femoral artery. There are two lumens in the abdominal aorta with the larger hypoperfused lumen giving rise to the right renal artery (blue arrow) and the smaller lumen perfusing the left kidney (white arrow). There is asymmetric opacification of the kidneys.



Figure 3: Still frame image of a Computed Tomography scan of the chest with 3D reconstruction with isolation of the thoracic aorta after removal of the heart. Intimal flap is seen indicating type A dissection (blue arrow).

threatening conditions that require immediate intervention such as type A aortic dissections. Although, cocaine was attributed as the cause of aortic dissections in only 1.8% of cases as mentioned before, failure to consider aortic dissection in the initial differential could result in fatal events. A recent study showed that 21% (9/44) of patients with aortic dissection were administered anticoagulation due to preliminary concern for acute coronary syndrome, which led to death, bleeding requiring surgery, and stroke from anticoagulation reversal in 44% of those patients.⁴

The proposed mechanism of dissection from cocaine intoxication involves prior weakening of the elastic media by an underlying process such as hypertension along with severe shear forces from the sudden profound hypertension and tachycardia seen with cocaine use.⁶ Another possible mechanism is that chronic cocaine use might lead to premature atherosclerosis as cocaine exposure makes the endothelium more permeable to atherogenic low-density lipoprotein and accelerates the migration of leukocytes to the aortic wall.⁷⁻⁹

The European Society of Cardiology and American Heart Association guidelines for diagnosing aortic dissection start by classifying patients based on their risk factors, history on presentation, clinical exam findings, and hemodynamic stability.^{10,11} Based on these factors, an imaging modality is selected to confirm the diagnosis. The most common options are CT, Magnetic Resonance Imaging (MRI), or Transesophageal Echocardiography (TEE). Newer generation multidetector helical CT scanners show a sensitivity of up to 100% with specificity of 99%.¹² Transthoracic Echocardiography and TEE both have the limitation of artifacts that mimic dissection flap.¹¹ Meanwhile, MRI is more accurate for thoracic aortic disease with sensitivities and specificities

equivalent or higher than CT and TEE. However, the time and protocol limit the use of this imaging modality in the setting of an emergency.¹³

Once diagnosed, the European Society of Cardiology recommends Type A dissections to undergo emergent surgical repair.¹⁰ Type B aortic dissections are instead usually treated medically unless the patient has dilatation of the aorta exceeding 55 mm of diameter, in which case Thoracic Endovascular Aortic Repair (TEVAR) is recommended.¹⁰ If the diameter of the aorta is 60mm or more and if the patient has an elastopathy, surgical repair is warranted.¹⁰ The American Heart Association, on the other hand, classifies patients based on hemodynamic stability. If hemodynamically unstable, Type A dissections should still undergo surgical repair emergently, but Type B dissections should be challenged with resuscitation first.¹¹ If resuscitation fails, however, then emergent surgical repair or TEVAR is recommended if the underlying lesion is reversible by the intervention.¹¹ If the patient is hemodynamically stable, medical management with beta blockers should be started to control the heart rate to a goal of less than 60 beats per minute and systolic blood pressure ranging between 100 and 120 mmHg.¹¹

Aortic dissections from cocaine use have particular differences with both short and long term outcomes compared to dissections secondary to other causes. A recent retrospective study using the IRAD showed that relative to non-cocaine induced dissections, patients with cocaine-induced aortic dissections had no differences with in-hospital complication rates of stroke, coma, or myocardial infarction.² However, they were more likely to have acute kidney failure (42.4% to 24.8%), possibly secondary to prolonged unopposed vasoconstriction from residual co-

caine metabolites and beta blocker use.² In-hospital mortality was lower for cocaine-using patients (6.1% to 25.5%) which the observers believed was due to the younger age of these patients on presentation.²

Long term management for patients after being discharged from the hospital revolves primarily around blood pressure control, with a target of less than 120/80 mmHg to help prevent recurrent dissections.¹⁴ Cocaine-using patients were more likely to remain on a beta blocker on discharge than non-cocaine users (100% to 83.5%).² In the population of cocaine users, it is especially important to provide counseling and resources to help the patient reduce substance use while controlling blood pressure to reduce the risk of further dissections. Serial imaging with CT or MRI is performed prior to discharge and at 3, 6, 12 month, and annual intervals, primarily to evaluate for possible extension of the dissection, aneurysm formation, or surgical leakage.¹⁴ Unfortunately, a recent retrospective study found that there were lower follow-up rates after aortic dissection in a cocaine-using cohort compared with non-cocaine users (34.5% to 51.7%).² There were no significant differences noted for overall mortality between these two groups but non-cocaine users had greater freedom from aortic re-hospitalization at the 5-year follow up (81.5% to 59.5% for cocaine users).²

In this paper, we discussed a rare presentation of cocaine-associated chest pain found to be a Type A aortic dissection. Physicians should think about aortic dissections as a differential of chest pain in cocaine users to provide immediate care and to avoid adverse events. Although, acute coronary syndrome should always be ruled out with chest pain and recent cocaine use, concurrent evaluation for possible aortic dissection can be done within the same timeframe.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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