






Case of Cocaine Induced Coronary and Carotid Artery Dissection

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Abstract

Cocaine use has been individually linked to both carotid and coronary artery dissections. However, their simultaneous occurrence has not been previously reported. A 30-year-old man who suffered an acute ischemic stroke and myocardial infarction secondary to acute carotid and coronary artery dissections, respectively, 16 hours after snorting cocaine. To our knowledge, this is the first reported case describing the simultaneous occurrence of carotid and coronary artery dissections resulting from cocaine use.

Keywords

stroke, dissection, cocaine, vasculopathy, myocardial infarction

Introduction

Cocaine use is implicated as a causative factor in young patients suffering ischemic stroke and myocardial infarction. As cocaine is a sympathomimetic, it stimulates alpha- and beta-adrenergic receptors within the body. Activation of alpha-adrenergic receptors in smooth muscles of cerebral and coronary vasculature results in arterial constriction and elevated systemic blood pressures. The combination of arterial constriction and elevated pressures may increase shear stress on the arterial walls resulting in arterial dissection. The impaired blood flow from vasospasm and dissection may culminate in ischemic stroke and myocardial infarction.

Case Presentation

A 30-year-old man with a history of hypertrophic cardiomyopathy and chronic uncontrolled hypertension presented with chest pain and sudden onset of blurring of vision of the right eye with left hemiparesis approximately 16 hours after snorting cocaine. His blood pressure upon arrival to the emergency room was 185/115 mm Hg.

There was no history of trauma. Results of laboratory testing are displayed in Table 1, showing significant elevation in troponin T. Electrocardiography showed normal sinus rhythm. Cardiac angiography and echocardiogram showed an ejection fraction of 70% without significant abnormalities (Figure 1). The dissection was a non-flow limiting and was in a distal location. Magnetic resonance

imaging of the brain revealed an ischemic stroke (restricted diffusion) in the right temporal-parietal junction and insula in the middle cerebral artery distribution (Figure 2). Computerized tomography angiography (CTA) of the head and neck (Figure 3) showed right internal carotid artery (ICA) occlusion.

The patient underwent left heart catheterization which revealed dissection of the distal right coronary artery involving the origin of posterior descending artery with thrombolysis in myocardial infarction (TIMI)-II flow (Figure 4). This was felt to be the causative lesion for the patient's chest pain and troponin abnormality. As the patient had already been started on aspirin and clopidogrel, intervention was undertaken with aspiration thrombectomy, balloon angioplasty, and subsequent stent placement in the distal right coronary artery into the posterior descending artery with restoration of TIMI-3 flow (Figure 5). He subsequently underwent cerebral angiogram showing complete occlusion of the right ICA. The occlusion had a tapering, "flame-shaped" appearance,

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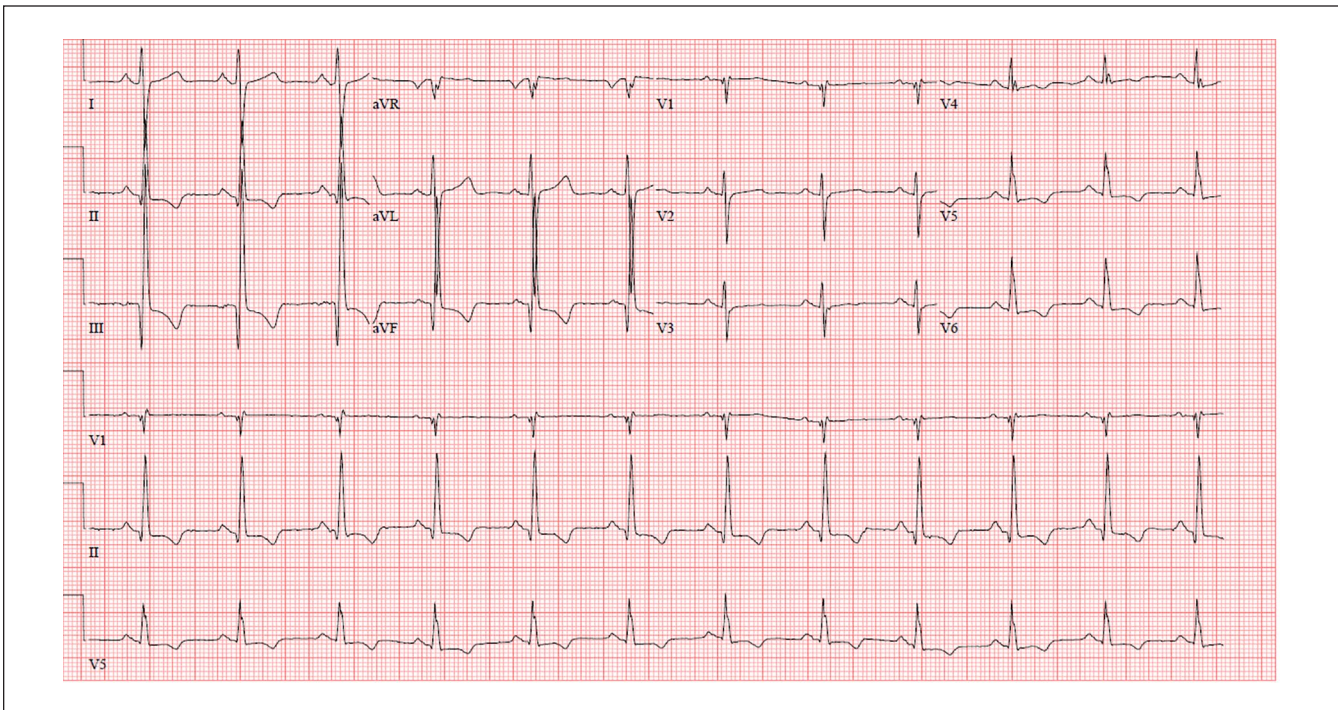
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Table I. Results of Laboratory Testing.

Laboratory test	Result	Reference range
Troponin T trend	947, 795, 824, and 924 ng/l	<22 ng/l
Brain natriuretic peptide	2952 pg/ml	≤125 pg/ml
Erythrocyte sedimentation rate	10 mm/h	<15 mm/h
C-reactive protein	13.73 mg/l	<5 mg/l
Antinuclear antibody	Negative	Negative
Dilute Russell viper venom test	44.7 seconds	0-47 seconds
Lupus anticoagulant-sensitive partial thromboplastin time	33 seconds	0-51.9 seconds
Anticardiolipin IgG	<9 U/ml	0-14 GPL U/ml
Homocysteine	10.3 umol/l	4-12 umol/l

Note: GPL refers to IgG Phospholipid units and one GPL unit is 1 microgram of IgG antibody.

**Figure 1.** EKG (Electrocardiogram) with T-wave inversions in inferior leads.

approximately 1 cm distal to the origin of the ICA—consistent with dissection (Figure 6).

The patient underwent physical therapy and occupational therapy while in the hospital with resolution of his left hemiparesis. He was discharged home on day 5 of hospitalization. He underwent repeat CTA of the head and neck in 6 months which revealed persistent occlusion of the right internal carotid artery. He has not had any further signs or symptoms of coronary ischemia.

Discussion

Cocaine-induced dissection of various arteries has been described in the literature, leading to cardiac and neurological complications.¹ The combination of hypertension and

intense vasoconstriction result in shear stress on the arterial wall, which may lead to atherosclerotic plaque rupture in those with vascular disease, and an increased risk of dissection even in those with normal arteries.

Coronary artery dissection from cocaine use has an approximate incidence of <1% of all coronary dissections.² It is a rare outcome and only a small contributor to the total mortality and morbidity resulting from cocaine use.³ Dissection from substance use falls under the category of spontaneous coronary artery dissection which accounts for less than 1% of all acute myocardial infarctions.³ In the context of cocaine use, carotid dissection rarely occurs in isolation and is usually reported in conjunction with or as a result of a concomitant aortic dissection.⁴



Figure 2. Magnetic resonance imaging of the brain revealed an ischemic stroke (restricted diffusion) in the right temporal-parietal junction and insula in middle cerebral artery distribution.

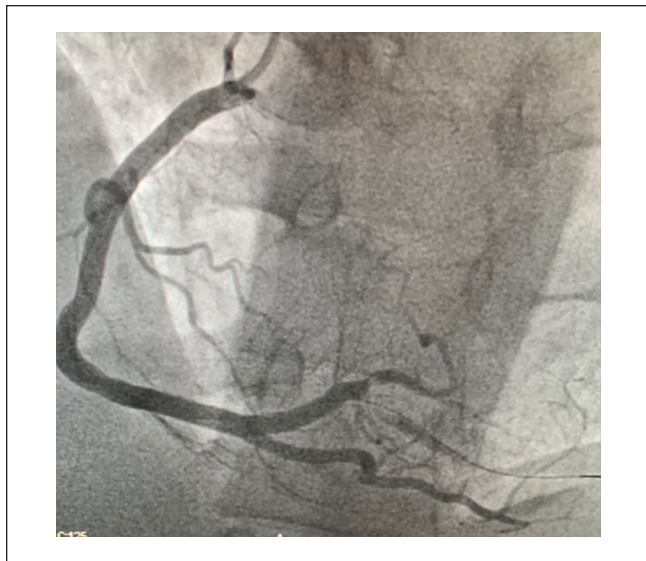


Figure 4. Coronary angiogram with dissection of the very distal right coronary artery (arrow) involving the origin of the right-sided posterior descending artery with TIMI-II flow. Abbreviation: TIMI, thrombolysis in myocardial infarction.

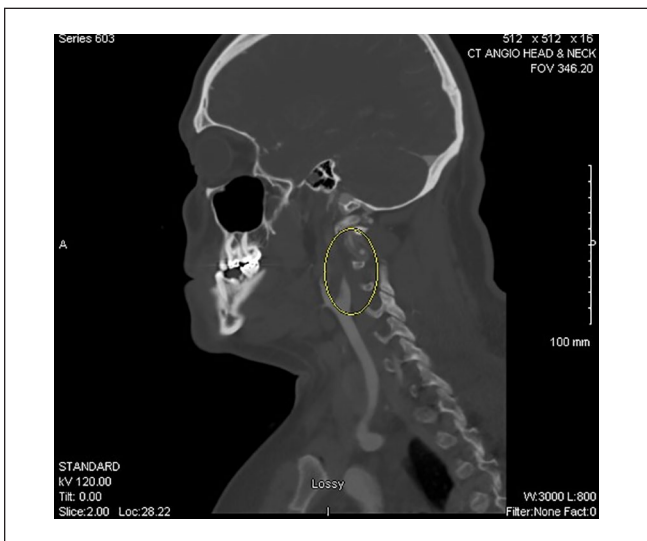


Figure 3. Computerized tomography angiography of the head and neck showed right internal carotid artery occlusion.

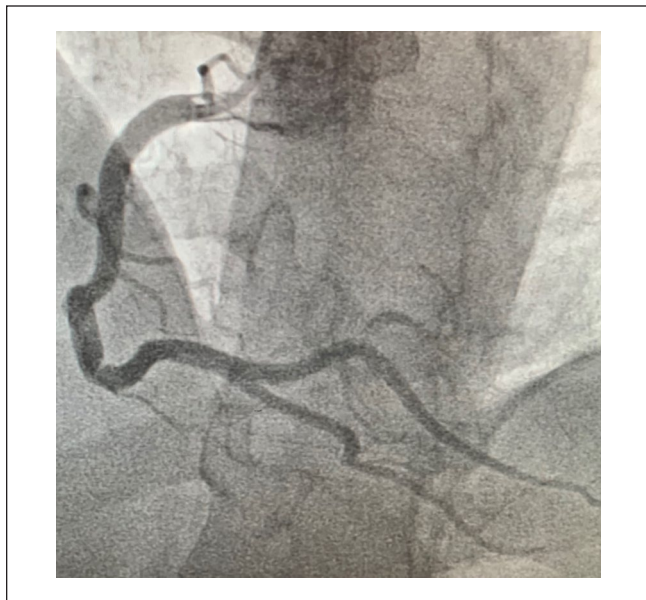


Figure 5. Coronary angiogram with TIMI-III flow post-intervention. Abbreviation: TIMI, thrombolysis in myocardial infarction.

Diagnosis of coronary artery dissection can be identified through coronary angiography or intravascular ultrasound.⁵ The majority of the dissections heal spontaneously, and patients treated medically have good long-term outcomes.³ Medical management is the preferred first-line intervention single or dual antiplatelet therapy together with a beta-blocker.⁶ Percutaneous intervention can be performed, yet challenging, requiring multiple stents with a high risk of restenosis. The high rate of restenosis leads to

preference for medical management, with PCI reserved for cases of failed medical management or refractory chest pain.

Carotid artery dissection is another vascular complication resulting from cocaine use. Of those that present with internal



Figure 6. “Flame-shaped” appearance of right ICA consistent with dissection.

Abbreviation: ICA, internal carotid artery.

carotid dissection, only 3% develop symptoms of ischemic stroke.³ The treatment of carotid artery dissection is still left to debate, although most practitioners initiate antiplatelet or anticoagulation therapy to decrease the risk of subsequent stroke.⁷ Thrombolysis and carotid artery stent placement are also plausible forms of intervention, but evidence is lacking regarding their efficacy compared to medical management.³

There have been few^{7,8} cases reported that presented with both simultaneous coronary and carotid artery dissections in the absence of traumatic aortic dissection. There have been no cases reported to date of concurrent coronary and carotid arterial dissection related to cocaine use.

Conclusion

Although cases of coronary artery dissection and cases of carotid artery dissection have been reported in the setting of cocaine use, there are no reports of them simultaneously occurring; this is the first such case. In patients with recent cocaine abuse presenting with focal neurologic deficits and/or cardiogenic chest pain, there should be a low threshold for evaluation of appropriate vasculature to exclude potential arterial dissection.

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Ethics Approval


Our institutional does not require ethical approval for reporting cases or case series.

Informed Consent

Verbal informed consent was obtained from a legally authorized representative for anonymized patient information to be published in this article.

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