

Case Report

Internal carotid artery and bilateral vertebral arteries dissections associated with amphetamine abuse: Case report

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ABSTRACT

Arterial dissection is an important cause of stroke in young patients. Various factors influencing arterial dissection included amphetamine abuse and anterior circulation is the majority of stroke locations. We reported the Case of a 40-year-old male patient with chronic amphetamine used since childhood. He had increased the consumption from once a month to every other day in the last year. The patient suffered from acute left-side hemiparesis and neglect. Computed tomography angiography of the brain and neck vessels demonstrated non-atheromatous vasculopathy with a suspected dissection process of the right internal carotid artery and bilateral vertebral arteries. A review of recent data is also provided to clarify the possible mechanism.

1. Introduction

This work consists of a single Case report and has been reported in accordance with SCARE 2020 criteria [1]. Cervical artery dissection (CAD) accounts for about 20 % of stroke in younger patients under 45 years old [2]. The clinical features include headache and neck pain, Horner's syndrome, and cranial nerve palsy. Etiopathogenesis of CAD is incompletely understood, though neck trauma, recent systemic or intracranial infections, and underlying arteriopathy are considered important [2,3]. Amphetamine is an increased risk of stroke due to its vasculopathic properties [4]. Some reported cases show internal carotid artery (ICA) or vertebral artery (VA) dissection related to amphetamine abuse; however, there is still limited data on ICA and VA dissections in young-onset stroke patients with amphetamine abuse. The present case reports in this setting and recent data review are also provided to clarify the possible mechanism.

1.1. Case presentation

A previously healthy 40-year-old right-handed male and non-morfanoid habitus presented with acute onset of left side weakness 12-h before admission. The patient had no complaints of headache, neck pain, or abnormal vision. His wife noticed mildly slurred speech and left side disinterestedness. The patient had no preceding trauma or neck manipulation. He confessed to amphetamine used since childhood and

increased the consumption from once a month to every other day in the last year. The patient did not abuse any other substance, including cocaine, heroin, or decongestant. He has no family history of cerebrovascular disease or premature atherosclerosis.

General physical examination was unremarkable except for hypertension of 182/76 mm Hg. Apart from left side hemiparesis grade I, neurological examination showed right gaze preference in primary position, left facial weakness, left-side neglect, and mild right arm dysmetria. The initial non-contrast computed tomography (CT) of the brain revealed hyperacute infarction of the right middle cerebral artery (MCA) territory. A computed tomography angiography (CTA) showed alternating stenosis and dilatation along the wall of the ICA cervical and petrous segment, bilateral VA V2-V3 segments (Fig. 1). These findings are preferred to be the spectrum of non-atheromatous vasculopathy with the suspected dissection process. Extensive workup, including complete blood count, blood chemistry, hypercoagulability and vasculitic profiles, anti-HIV, electrocardiography, Holter monitoring, and transthoracic echocardiography with saline agitation test were all unremarkable. Toxicology screening revealed a significant positive test for amphetamine in the urine.

The patient was treated with antiplatelet therapy (aspirin 300 mg), anti-hypertensive agents, and rehabilitation. He was admitted to the acute stroke unit for twelve days and discharged with moderately residual neurological deficit, modified Rankin Scale (mRS) of 4. At one month follow-up, the patient was explicitly improved in motor function.

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Mild residual dysarthria and still had left-side neglect were observed. We plan to re-evaluate CTA cerebral vessels three to six months after the stroke onset. A multidisciplinary team including a primary physician, psychiatrist, and therapy activist involves helping the patient with amphetamine abstinence. The patient recognizes the adverse effects of amphetamine abuse and is willing to lifelong discontinuation. He continues a home rehabilitation program to enhance stroke recovery.

2. Discussion

The major causes of stroke in young adults and children differ from those in older people. Arterial dissection is one of many causes that we must not miss due to a life-threatening and treatable condition. They may present as transient attacks (often stereotyped) or complete stroke, which develop in as many as 20 % of cases [5]. ICA dissection is much more common than VA dissection, but both can present simultaneously. Several risk factors have been proposed for CAD, including neck or cervical trauma, inherited connective tissue disorders (Ehlers-Danlos syndrome and Marfan's syndrome), hypertension and migraine without aura [6]. In our Case, there are no clinical clues or laboratory results that explained the cause of ICA and VA dissections unless a history of chronic and incremental amphetamine abuse with a strongly positive result of urine amphetamine.

Amphetamine is a sympathomimetic amine, and it acts as a central nervous system behavioral stimulant. Hemorrhagic stroke, including intracerebral and subarachnoid hemorrhage, is the most common cerebrovascular complication of amphetamine abuse, accounting for 67 % of cases [7]. The remaining one-third is diagnosed as ischemic stroke, and anterior circulation is the majority of stroke locations. Recently, two Case reports described VA dissection in a patient with amphetamine abuse [8,9]. Interestingly, both cases had a history of increasing amphetamine consumption before developing the stroke syndrome, which occurred with our patient. Moreover, the dissection of ICA and VA related to amphetamine abuse is not frequently reporting. A Ewida et al. reported spontaneous dissection of bilateral ICA and VA in a middle-aged woman taking a pill for weight loss containing an amphetamine derivative [10]. Although this may be a coincidental finding, the association between amphetamine abuse and arterial dissection cannot be excluded. Our patient had multiple vascular dissections and raised the possibility for the association with amphetamine abuse.

The proposed for amphetamine-related vascular injury have been described by several mechanisms, include vasculitis, vasospasm, hypertension, or direct endovascular toxicity [11]. A pathology study in a middle-aged patient with left MCA stroke and multiple anterior circulation vasculopathy due to amphetamine abuse revealed severe atherosclerosis with a ruptured plaque and thrombus formation. Furthermore, there was no evidence of inflammatory cell infiltration in the vessel walls. These findings suggest the process of premature atherosclerosis to be the underlying mechanism [7].

The current treatment guidelines recommend that intravenous thrombolysis is not contraindicated for patients with hyperacute to acute extracranial cervical and intracranial arterial dissection, except for aortic arch dissection. Based on the CADISS (Cervical Artery Dissection in Stroke Study) in 2015, there were no significant differences in recurrent stroke and all-cause mortality between anticoagulant and antiplatelet therapy in patients with extracranial carotid and VA dissection. It is reasonable to treat patients with either antiplatelet or anticoagulant for three to six months [12]. The prognosis of CAD is favorable, and blood vessel resolution is noted in up to 80 % of patients [13].

3. Conclusion

Arterial dissection is a potentially disabling and probably under-diagnosed stroke cause, mainly affecting young adults. Screening tests for amphetamine abuse should be warranted in younger stroke patients who presented with multisite arterial dissections and do not have significant vascular risk factors. More cases and studies are needed to demonstrate a more precise relationship and underlying mechanisms.

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Ethical approval

The Medical Ethics Committees of the Faculty of Medicine, Chiang Mai University approved this Case report.

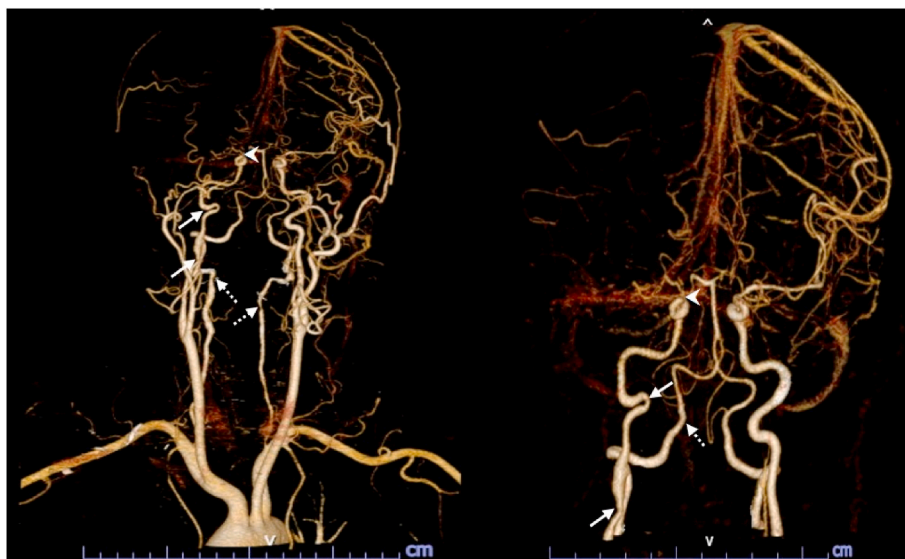


Fig. 1. CTA cerebral vessels demonstrated alternating stenosis and dilation along the right ICA cervical and petrous segment wall (bold white arrow), bilateral VA V2-V3 segment (white dash arrow). Abrupt severe luminal narrowing to occlusion at right ICA supraclinoid segment is noted (white arrowhead). These findings are preferred non-atheromatous vasculopathy with suspected dissection process at the right ICA and bilateral VAs.

Consent

Written informed consent was obtained from the patient for publication of this Case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Nopdanai Sirimaharaj, M. D: contributed to data collection, literature review, and first draft manuscript preparation. Kitti Thiankhaw, M. D: contributed to neurological management, data collection, literature review, writing, and manuscript editing.

Research registration

This Case report was registered at <http://www.researchregistry.com>. The unique identifying number is researchregistry7008, and the hyperlink to specific registration is <https://www.researchregistry.com/browse-the-registry#home/>.

Guarantor

Kitti Thiankhaw, M.D.ORCID.

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Declaration of Competing interest

The authors have no conflicts of interest to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2021.102676>.

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Nopdanai Sirimaharaj, M. D: contributed to data collection, literature review, and first draft manuscript preparation.

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Please state any conflicts of interest

The authors have no conflicts of interest to declare.

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1. Name of the registry: Internal carotid artery and bilateral vertebral arteries dissections associated with amphetamine abuse: Case report
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The following information is required for submission. Please note that failure to respond to these questions/statements will mean your submission will be returned. If you have nothing to declare in any of these categories then this should be stated.

Consent

Written informed consent was obtained from the patient for publication of this Case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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