Marijuana-related Reversible Cerebral Vasoconstriction Syndrome

Takahisa Mikami \textsuperscript{1,2}, Reiichiro Obata \textsuperscript{1}, Daniel I. Steinberg \textsuperscript{1}, Maryna Skliut \textsuperscript{1} and Irene Boniece \textsuperscript{3}

Abstract:
The legalization of recreational marijuana in some countries has been accompanied by an increased number of case reports of serious cardiovascular and cerebrovascular complications. However, there have been few studies describing the detailed clinical course of reversible cerebral vasospasm syndrome (RCVS) associated with marijuana use. We herein report a unique case of recurrent bi-fronto-parietal subcortical (watershed) infarction in the setting of chronic daily marijuana use for several years, with evidence of bilateral anterior cerebral artery vasoconstriction. The quick resolution of symptoms with treatment and the normalization of cerebral vasoconstriction on follow-up imaging lend high certainty to the diagnosis of RCVS.

Key words: RCVS, cannabinoid, marijuana

Introduction

The legalization of recreational marijuana has been accompanied by an increased number of case reports of serious cardiovascular and cerebrovascular complications (1). However, there have been few studies describing the detailed clinical course of reversible cerebral vasospasm syndrome (RCVS) associated with marijuana use.

We herein report a case of marijuana-related RCVS in a patient with a history of recurrent stroke.

Case Report

A 42-year-old woman presented with a 4-day history of headache, nausea and vomiting and a 14-hour history of left-sided weakness and numbness. She was a habitual daily cannabis smoker, and her last use of marijuana had been four days prior to admission.

The patient’s medical history was notable for an initial diagnosis of stroke at an outside hospital 14 months prior, when she presented with acute onset of right-sided weakness, gait imbalance and tingling in both hands that was associated with headache, nausea and vomiting. Her only remarkable medical history at the time was being an active smoker of tobacco cigarettes and marijuana, which she had smoked daily for eight years. Imaging studies, including magnetic resonance imaging (MRI) and a computed tomography (CT) angiogram (CTA), revealed bilateral subcortical centrum semiovale fronto-parietal subcortical (watershed) infarction with no evidence of stenosis or occlusion of the intra- and extracranial vessels. The diagnostic workups, including a transesophageal echocardiogram and hypercoaguable blood panel, were unremarkable, so an implantable loop recorder was placed. She was placed on antiplatelet therapy and statin therapy, with which she was compliant. Her symptoms gradually improved over the course of rehabilitation in the subsequent few weeks. While she stopped smoking tobacco, she continued to smoke marijuana on a daily basis. She had had other intervening hospitalizations and reported that she had recently been admitted about two months earlier with a possible seizure, at which time MRI had demonstrated biparietal vertex stroke. She had been prescribed levetiracetam but never taken it. She had had no further seizure-like events.

On presentation to our emergency room, the patient was alert and oriented to her name, age and current month but not the name of the hospital. She was easily distractible

\textsuperscript{1}Department of Medicine, Icahn School of Medicine at Mount Sinai, Mount Sinai Beth Israel, USA, \textsuperscript{2}Department of Neurology, Tufts Medical Center, USA and \textsuperscript{3}Department of Neurology, Icahn School of Medicine at Mount Sinai, Mount Sinai Beth Israel, USA

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Correspondence to Dr. Takahisa Mikami, taka.mikami.tmd@gmail.com
The patient initially presented hemispatial neglect on clock-drawing test (A), followed by improvement after the initiation of verapamil on hospital day 2 (B, day 3; C, day 5). Brain MRI demonstrated restricted diffusion (D) and increased fluid attenuated inversion recovery signals (E) at the bilateral high convexity subcortical area of the parietal lobes. A magnetic resonance angiogram (F) and CT angiogram (G) were notable for diffuse vasoconstriction of the cerebral arteries, especially in the anterior cerebral arteries (shown with yellow arrowhead). The cerebral angiogram performed on hospital day 6 showed normal cerebral arteries [H, branches of the right internal carotid artery (ICA); I, branches of the left ICA].

with limited attention. Her language function was intact, and her speech showed no dysarthria. Her visual fields were full. A motor examination was notable for left-side-predominant bilateral weakness (right limbs showing antigravity with drift, left arm showing no movement against gravity, left leg drifting and falling to the bed). There was left-sided spatial and personal inattention (see also clock-drawing test; Figure A-C) and left-right confusion. Sensation to a pin was decreased on the left side, but sensory extinction was not present. Coordination was intact in the right limbs and left leg but not testable in the left arm due to the degree of weakness. Her initial National Institutes of Health Stroke Scale (NIHSS) score was 8.

Initial CT findings were notable for bilateral frontal centrum semiovale hypodensity, with the left side more significantly affected than the right. The findings from a magnetic resonance angiogram (MRA) and CTA were notable for diffusely narrowed cerebral arteries, particularly the anterior cerebral arteries (ACAs), with no large vessel occlusion (Figure F, G). MRI demonstrated restricted diffusion (Figure D) and increased fluid attenuated inversion recovery signals (Figure E) at the bilateral high convexity subcortical areas of the frontal and parietal lobes (right-side predominant). Laboratory tests, including autoimmune and coagulopathy evaluations, were unremarkable except for mildly elevated C4 (64 mg/dL). Urine toxicology screening was positive for cannabinoids. Magnetic resonance venography, an electroencephalogram, an electrocardiogram, and transthoracic echo-
higher brain dysfunction following treatment. Rent stroke, and was accompanied by the rapid resolution of simultanagnosia, optic ataxia and ocular apraxia re-

The present marijuana-related RCVS case was unique in that 1) the patient was a woman, and 2) her head-

Several mechanisms of action underlying marijuana-induced brain ischemia have been reported, including vaso-

The patient’s clinical features of headache, bilateral watershed infarctions on MRI, bilateral reversible cerebral artery stenosis, and improvement of neurologic deficits after in-

Although most patients with RCVS present with “explosive-onset, worst-ever” headaches, or thunderclap headaches, 15% of patients do not follow this typical presen-

The patient’s history of stroke was also considered to be secondary to marijuana-related RCVS given the same clini-

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Discussion

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The authors state that they have no Conflict of Interest (COI).

Table. Characteristics of Patients with RCVS Associated with Marijuana.

| Type of RCVS                      | Cannabis-related | Not related to cannabis use |
|----------------------------------|------------------|----------------------------|
| Age [median (IQR)]               | Younger [27 (20-38)] | Older [51 (38-56)] |
| Sex (female, %)                  | Predominantly male (33%) | Predominantly female (77%) |
| Thunderclap headache (%)         | Less frequent (33%) | More frequent (71%) |

The data was collected from a retrospective cohort study by Jensen J. et al. (4) RCVS: reversible cere-

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