

## Simultaneous Development of Ischemic Stroke and Myocardial Infarction after Bonsai use in a Young Patient

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### Abstract

Bonsai is a synthetically-derived addictive substance that has cannabis-like effects. In recent years, abuse has increased especially among adolescents and teenagers all over the world. The increased prevalence of bonsai abuse results in an unusual clinical presentation of the young population to emergency services. In this case, a 31-year-old male who was diagnosed with acute coronary syndrome simultaneously with acute ischemic stroke after intensive bonsai use was presented. The present case report aimed to emphasize the need of considering the use of SCs, such as bonsai, in differential diagnosis when evaluating young patients who are not risk factors for cardiovascular disease and present an unusual clinical picture, such as stroke and myocardial infarction. Patients should be informed about the possible side effects of these substances when they are discharged. They should also be encouraged to even get some professional help

**Keywords:** ischemic stroke, myocardial infarction, bonsai

### INTRODUCTION

Substances such as synthetic cannabinoids (SCs) are increasingly used among the young population all over the world and hence are an important threat to public health. SCs are known in different countries with different names such as K2, spice, bonsai. According to the literature, the use of SCs often leads to cardiovascular events, whereas the development of cerebrovascular events is less common. (1-3) This study reported the case of a 31-year-old male patient with coexisting acute ischemic stroke and myocardial infarction after the intensive use of bonsai.

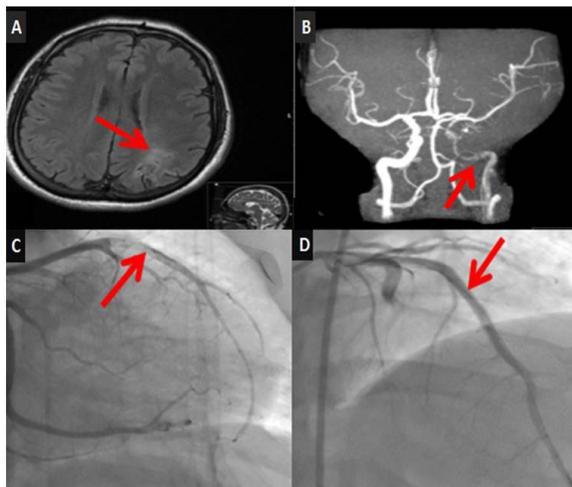
### CASE REPORT

A 31-year-old male patient was brought to the emergency clinic with complaints of weakness on the right side of his body and speech disorder, which started about 3 h ago. The patient had been smoking for about 20 years and used bonsai for about 3 years when his anamnesis became deeper. The patient stated that he received bonsai from a different source during the last 20 days and used it excessively in

the last 24 h. He was conscious, co-operative, and oriented during his physical examination. His body temperature was 37.6 °C, heart rate 110 beats/min, and blood pressure 158/95 mm Hg. The patient had no pulmonary system abnormality except tachycardia in his cardiac examination. He had a focal neurological deficit and hence underwent cranial imaging to detect an acute cerebrovascular event. The diffusion magnetic resonance imaging (MRI) revealed an ischemic infarct in the left parieto-occipital region (Fig. 1A). It also showed a thrombus that caused 80% occlusion in the left carotid artery (LCA) (Fig. 1B). The patient's complete blood count, liver and kidney function tests, and electrolyte levels were normal. His cardiac Troponin I value was 0.72 µg/L (normal range: 0.01–0.23 µg/L). This high troponin value in the patient diagnosed with ischemic stroke was thought to be noncardiac in origin. However, echocardiography was performed under emergency condition because some findings suggested subacute anterior myocardial infarction in all precordial derivations in the electrocardiography (ECG) (Fig.

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2). Hypokinesia was observed in the anteroapical segment of the ventricle (LV). The ejection fraction was measured as 48% by the Simpson method. After a neurology consultation, an antithrombotic therapy was started and an early invasive procedure was planned. No significant occlusion was detected in the left main coronary, right coronary, and circumflex coronary arteries, whereas a massive thrombus was seen in the middle region of the left anterior descending coronary artery (LAD) (Fig. 1C). A successful percutaneous coronary intervention was applied to the patient (Fig. 1D). The vasculitis markers such as ANCA, ANA, anti-ds DNA, anti-SM, anti-Jo1, anti-SCL70 and anti-gliadin antibodies were detected in the normal ranges in the toxicology analyses performed during patient's follow-up. Patient's hypercoagulability tests, including homocysteine, antithrombin 3 activity, protein C/S, anticardiolipin, and antiphospholipid antibodies were normal. It was decided that the only factor responsible for the patient's current clinical condition was bonsai use. Neurology and psychiatry clinics' opinions were also taken for the patient who developed no complication during follow-ups and hence was discharged after planning his medical treatment and polyclinic controls.

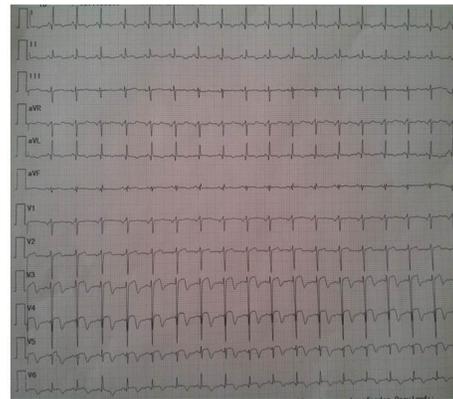


**Figure 1A.** Ischemic infarct in the left parieto-occipital region in cranial MRI

**B.** Thrombus in the left carotid artery in cranial MRI angiography

**C.** Massive thrombus was seen in the middle region of the LAD

**D.** LAD coronary artery after percutaneous coronary intervention



**Figure 2.** Subacute anterior myocardial infarction in all precordial derivations in ECG

## DISCUSSION

Synthetic derivatives of cannabis (such as bonsai) have been widely used in recent years worldwide by young adults because of their lower cost and easier accessibility. (4) The bonsai, which contains many SCs in varying proportions with a maximum content of JWH-018, is a mixture of dried plants and sold as an alternative to cannabis. (5) Bonsai is usually used as a form of cigarette by the addicts. The SCs, whose harmful effects are ignored all over the world by their addicts because they have cannabis-like effects, are being used more unconsciously. (6) The bonsai taken by inhalation binds to cannabinoid receptors 1 and 2 as a full agonist with a higher affinity compared with natural cannabinoids. Therefore, its addiction and adverse effect potential are higher than those of non-SCs. (7) Its production is not standardized, and its effects on addicts vary depending on the density of the substances contained in it. SCs have many side effects mainly on the cardiovascular and cerebrovascular systems. These include nausea, vomiting, agitation, hallucination, variability in perception level, epileptic seizures, bradycardia, tachycardia, hypertension, acute myocardial infarction, and renal failure. (8) The acute effects of cannabinoids on the cardiovascular system comprise tachycardia and hypertension due to sympathetic system hyperactivation. (2) These acute effects of SCs are implicated in the development of cerebrovascular events. In this case, both the blood pressure and the heart rate were high in the evaluation of the emergency department. In the literature silent myocardial infarction cases have been reported after SK use. (2) It has been suggested that the sedative effects of the use of SCs in these cases mask some

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symptoms such as chest pain. The patient in this case did not have a chest pain during admission to the hospital, suggesting a silent myocardial infarction. Thus, ECG and cardiac troponin levels were found to be consistent with myocardial infarction in the patient. In fact, how SCs cause stroke and myocardial infarction is still not clear. Recent studies have reported that SCs may trigger vasospasm, arrhythmia, central nervous system vasculitis, and orthostatic hypotension, leading to stroke development.(8) The MR angiography in the present case suggested that an embolus resulting from the thrombosed lesion detected in the LCA was responsible for stroke development. A number of clinical conditions have been implicated in cases of myocardial infarction associated with SC use, such as increased platelet aggregation and factor VII levels, slow coronary flow, vasospasm, atherosclerotic plaque rupture and impaired myocardial oxygen supply-demand balance. (7,9,10) It has also been suggested that the use of SC may trigger myocardial infarction by triggering endothelial dysfunction and vasoconstriction. On the contrary, no atherosclerotic lesion was found in some of the myocardial infarction cases associated with the SC use. (2) In the present case, a massive thrombus in the LAD was thought to develop secondary to plaque rupture.

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**Citation:** Muhammet GURDOGAN, Ugur OZKAN. *Simultaneous Development of Ischemic Stroke and Myocardial Infarction after Bonsai use in a Young Patient. Archives of Cardiology and Cardiovascular Diseases. 2018; 1(1): 37-39.*

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