

# Acute Anterior Myocardial Infarction Following Single Dose Synthetic Cannabinoid (Bonsai) Use: Case Report

## Tek Doz Sentetik Kannabinoid (Bonzai) Kullanımı Sonrası Gelişen Akut Anterior Miyokard İnfarktüsü

Saim SAĞ,<sup>a</sup>  
Fatih GÜNGÖREN,<sup>a</sup>  
Ercan ÇEĞİLLİ,<sup>a</sup>  
Osman Akın SERDAR,<sup>a</sup>  
Ali AYDINLAR<sup>a</sup>

<sup>a</sup>Department of Cardiology,  
Uludag University Faculty of Medicine,  
Bursa

Geliş Tarihi/Received: 11.11.2015  
Kabul Tarihi/Accepted: 27.04.2016

Yazışma Adresi/Correspondence:  
Saim SAĞ  
Uludag University Faculty of Medicine,  
Department of Cardiology, Bursa,  
TÜRKİYE/TURKEY  
saimsağ@gmail.com

**ABSTRACT** Nowadays synthetic cannabinoid (bonsai) is the most common substance of drug abuse in young adults because of its euphoric and addictive effects. Recently, bonsai use associated acute coronary syndromes and deaths have seen among Turkish youth. Yet there is limited evidence about bonsai induced acute myocardial infarction and the exact contribution of bonsai smoking to acute coronary syndrome and its mechanism are not known. We hereby reported a case of acute anterior myocardial infarction following bonsai smoking in a young male.

**Key Words:** Anterior wall myocardial infarction; cannabinoids

**ÖZET** Günümüzde, sentetik kanabinoid (bonsai) gençler arasında haz verici ve bağımlılık yapma etkisinden dolayı kullanılan en yaygın maddedir. Son zamanlarda, bonsai kullanımı ile ilişkili akut koroner sendrom ve ölümler Türk gençleri arasında görülmektedir. Ancak, bonsai ilişkili akut miyokard infarktüsü hakkında bilgiler sınırlıdır ve bonsai içimi ile akut koroner sendrom gelişme mekanizması tam olarak bilinmemektedir. Bu olgu sunumunda, bonsai kullanımı sonrası akut anterior miyokard infarktüsü geçiren bir genç erkek hasta bildirilmiştir.

**Anahtar Kelimeler:** Anterior duvar miyokard infarktüsü; kannabinoidler

**Türkiye Klinikleri J Case Rep 2016;24(2):131-3**

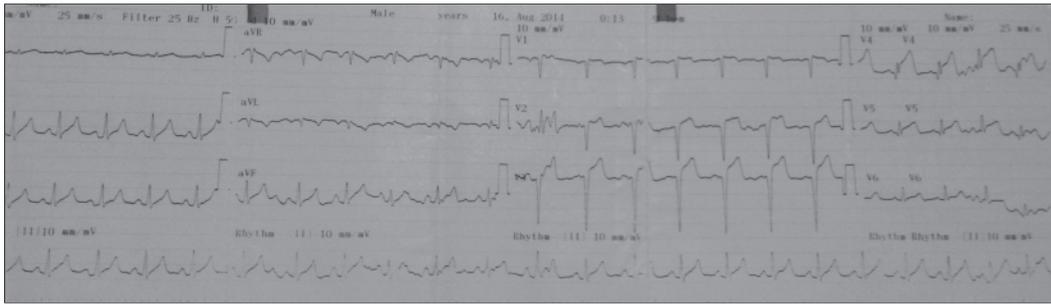
Synthetic cannabinoid (SC) use is particularly common among adolescents due to its sociocultural, psychotropic and addictive effects.<sup>1</sup> Substances that contain SC are known as “Spice” in Europe, “K2” in America, and “Bonsai” in Turkey<sup>1</sup>. Recently, deaths of uncertain etiology associated with Bonsai use have occurred among Turkish youth. Despite the known effects of SCs on the cardiovascular system, the mechanism of action in acute coronary syndromes (ACS) and coronary artery disease (CAD) is unclear.<sup>2</sup> We present a case admitted to the emergency department (ED) with acute anterior myocardial infarction (MI) secondary to Bonsai use.

### CASE REPORT

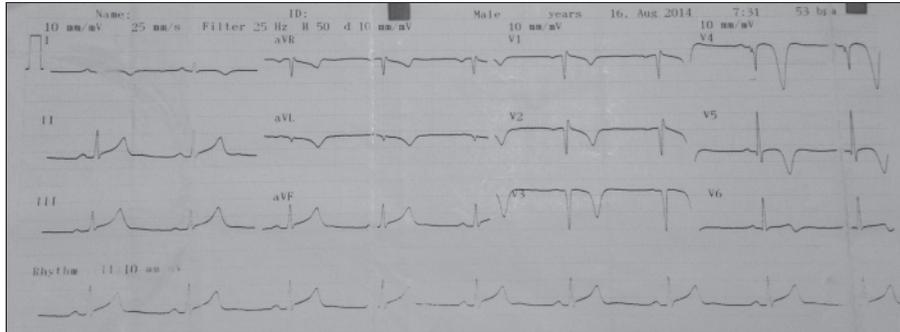
A 28 year old man with no significant past medical history presented at the ED with chest pain that had begun 4 hours after the use of Bonsai. He had no acute distress and was conscious but agitated. His blood pressure was

doi: 10.5336/caserep.2015-48601

Copyright © 2016 by Türkiye Klinikleri



**FIGURE 1:** ST segment elevation in elevation in V1-V4 and reciprocal ST depression in D2, D3, aVF on 12-derivation ECG obtained in the emergency department.



**FIGURE 2:** ST-segment resolution after thrombolytic treatment.

150/80 mmHg and pulse was 78/min. A physical examination was normal. Family history was negative for CAD. He had a 10-year history of substance abuse, including ecstasy, cannabis, and paint thinner. The patient used tobacco and alcohol. Initial assessment revealed CK:276 IU/L, CK-MB:58 IU/L, and troponin: 0.844 ng/mL. His alcohol level was 0.0001 permille and urine and blood drug screen results were negative except for the presence of cannabinoids. Electrocardiography showed ST elevation in V1-V4 and ST depression in D2, D3, aVF (Figure 1). The patient was diagnosed with acute anteroseptal MI and admitted to the intensive care unit. Echocardiography showed hypokinetic apical anterior septum and apex with ejection fraction (EF) of 50%. The patient received 300 mg aspirin, 600 mg clopidogrel and 100 mg/kg unfractionated heparin. Considering the probability of coronary vasospasm, intravenous nitroglycerin and adenosine was administered, however pain and ST elevation did not resolve. Due to the patient's age, thrombus-related MI was considered in diagnosis and he received 50 mg (10,000 U) tenecteplase (Metalyse®) by I.V. bolus. After 30 minutes, chest

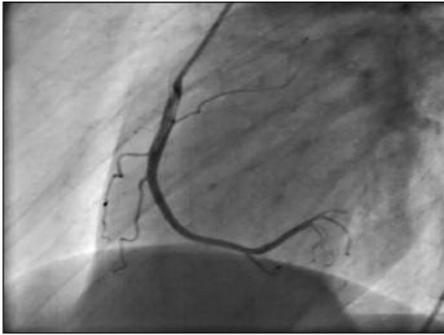


**FIGURE 3:** Coronary angiography showed normal left main coronary artery (LMCA), left anterior descending artery (LAD) and circumflex artery (Cx).

pain was alleviated and ST elevations resolved (Figure 2). Coronary angiography showed normal coronary vessels (Figure 3 and 4).

## DISCUSSION

Due to euphoric effects, the prevalence of SC abuse has been increasing among young adults, resulting in an increase in related intoxication cases.<sup>3</sup> The exact mechanism of MI after SC use has not been clarified by previous reports.<sup>4-7</sup> Patients who expe-



**FIGURE 4:** Coronary angiography showed normal right coronary artery (RCA).

rience MI after SC use are typically young adult smokers with no other CAD risk factors.

SCs can cause sweating, vomiting, hypertension/hypotension, chest pain, tachycardia/bradycardia, respiratory depression, confusion, psychomotor agitation, somnolence, and sedation.<sup>1,2,8</sup> One study reported 3 adolescents who experienced ST-elevation MI after SC abuse.<sup>4</sup> These patients developed chest pain days after use, demonstrated ST elevation in ECG and elevated troponin in blood chemistry, although coronary angiography failed to reveal the presence of vascular disturbances. Similarly, the present case exhibited normal coronary vessels on angiography.

Data regarding pharmacologic characteristics of SC are limited. Tetrahydrocannabinol (THC) is a component of SCs that may cause vascular thrombotic complications, coronary thrombosis, and spasms.<sup>5,6,8</sup> THC may contribute to autonomic derangements and lead to an increase in heart rate and blood pressure, increasing cardiac output and

myocardial oxygen demand.<sup>9</sup> THC is also associated with vascular inflammation and platelet activation, plaque rupture, and increased MI risk.<sup>4,10,11</sup> SCs contribute to MI through effects on cardiovascular system. In the present case, the patient did not respond to nitroglycerin and adenosine administered to reverse possible coronary spasm. The ECG findings after thrombolytic and the absence of coronary lesions support the diagnosis of thrombus-related MI caused by SC abuse. If we performed coronary angiography on admission, total occlusion of LAD could be detected. In this situation stent would be necessary to insert for revascularization. After inserting the stent, the young patient could come across with stent restenosis. Therefore, thrombolytic therapy option for patients with this condition could consider a higher priority.

SCs bind to cannabinoid receptors with high avidity.<sup>2,4</sup> It was not possible to determine the dose of Bonsai used or the identity of the other vasoactive/thrombogenic substances contained in the product. However, the occurrence of MI after first-time use indicates that SCs may be associated with a greater risk of ACS relative to other commonly abused substances.

In conclusion, unexplained deaths among SC abusers may be attributable to MI. To prevent myocardial damage and decrease associated mortality, all young patients who present to ED with chest pain should be questioned regarding SC abuse, and evaluated with ECG and cardiac enzyme biochemistry.

## REFERENCES

1. Evren C, Bozkurt M. Synthetic cannabinoids: Crisis of the decade. *Dusunen Adam The Journal of Psychiatry and Neurological Sciences* 2013; 26(1):1-11.
2. Vardakou I, Pistos C, Spiliopoulou Ch. Spice drugs as a new trend: mode of action, identification and legislation. *Toxicol Lett* 2010;197(3):157-62.
3. Schneir AB, Cullen J, Ly BT. "Spice" girls: synthetic cannabinoid intoxication. *J Emerg Med* 2011;40(3):296-9.
4. Mir A, Obafemi A, Young A, Kane C. Myocardial infarction associated with use of the synthetic cannabinoid K2. *Pediatrics* 2011;128(6):e1622-7.
5. Kocabay G, Yildiz M, Duran NE, Ozkan M. Acute inferior myocardial infarction due to cannabis smoking in a young man. *J Cardiovasc Med (Hagerstown)* 2009;10(9):669-70.
6. Canga Y, Osmonov D, Karataş MB, Durmuş G, İlhan E, Kirbaş V. Cannabis: a rare trigger of premature myocardial infarction. *Anadolu Kardiyol Derg* 2011;11(3):272-4.
7. Lee KB, Song BG, Kang GH, Park YH. Cannabis smoking and sildenafil citrate induced acute coronary syndrome in a patient with myocardial bridge. *Anadolu Kardiyol Derg* 2013; 13(2):180-1.
8. Castellanos D, Singh S, Thornton G, Avila M, Moreno A. Synthetic cannabinoid use: a case series of adolescents. *J Adolesc Health* 2011; 49(4):347-9.
9. Aryana A, Williams MA. Marijuana as a trigger of cardiovascular events: speculation or scientific certainty? *Int J Cardiol* 2007;118(2): 141-4.
10. Mittleman MA, Maclure M, Sherwood JB, Mulry RP, Tofler GH, Jacobs SC, et al. Triggering of acute myocardial infarction onset by episodes of anger. Determinants of Myocardial Infarction Onset Study Investigators. *Circulation* 1995; 92(7):1720-5.
11. Ayhan H, Aslan AN, Süygün H, Durmaz T. [Bonsai induced acute myocardial infarction]. *Turk Kardiyol Dern Ars* 2014;42(6):560-3.