

Atrial fibrillation following synthetic cannabinoid abuse

Sentetik kanabinoid kullanımını takiben gelişen atriyum fibrilasyonu

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Summary– Marijuana and its synthetic forms, called synthetic cannabinoids (SCs), are used as recreational drugs. Bonzai is a kind of SC. Adverse cardiovascular events have been reported with abuse of marijuana and SCs, including arrhythmia, myocardial infarction, and sudden cardiac death. Presently described is a case of a 23-year-old, previously healthy man, who was admitted to the emergency department with atrial fibrillation after Bonzai abuse. Sinus rhythm was restored during observation.

Özet– Esrar ve sentetik kanabinoidler olarak adlandırılan esrarın sentetik formları eğlendirici ilaçlardır. Bonzai bir tür sentetik kanabinoiddir. Esrar ve sentetik kanabinoidlerin kötüye kullanımı sonrası aritmi, miyokart enfarktüsü ve ani kalp ölümü gibi kötü sonuçlu kardiyovasküler olaylar bildirilmiştir. Biz burada bonzai kullanımı sonrası acil servise atriyum fibrilasyonu ile kabul edilen ve gözlem sırasında sinüs ritmi tekrar sağlanan, 23 yaşında, öncesinde sağlıklı olan bir erkek bireye ait vakayı sunduk.

Marijuana (or natural cannabinoid) and its synthetic forms are used worldwide for their recreational effects. The prevalence of abuse of synthetic forms of marijuana, called synthetic cannabinoids (SCs), has been increasing, especially in young individuals. They are often preferred due to low price and ease of purchase. One of several SCs in Turkey is called Bonzai, a mixture of herbal blend and SCs. One-pentyl-3-(1-naphthoyl)indole (JWH-018) is widely used in our country.^[1] Several forms of adverse cardiovascular events have been reported in relation to use of SCs and marijuana, such as arrhythmia, myocardial infarction, and sudden cardiac death.^[2] Atrial fibrillation has been reported due to marijuana use, but only 1 event has thus far been reported as result of SC use.

vealed no abnormal findings, except tachycardia and arrhythmia. Arterial gas analysis indicated oxygen saturation 92% in room air, pH of 7.35, pCO₂ of 26 mmHg, and normal bicarbonate and lactate. Laboratory tests revealed leukocytosis (white blood cell count: 13,000); other parameters were normal. Nasal oxygen and intravenous hydration were supplied immediately. Naloxone was administered intravenously due to possibility of opiate use. Thorough history was provided by friend, who reported that patient had smoked Bonzai for the first time, but did not abuse any other drug, including alcohol. During observation, the patient regained consciousness and sinus rhythm was restored spontaneously (Figure 2).

Abbreviations:

AF	Atrial fibrillation
SC	Synthetic cannabinoid
THC	Delta-9-tetrahydrocannabinol

CASE REPORT

A 23-year-old man who had no previous health problems was brought to the emergency department with shortness of breath, confusion, and palpitations. On admission, electrocardiogram indicated atrial fibrillation (AF) with heart rate 137/bpm (Figure 1). Physical examination revealed arterial blood pressure of 100/70 mmHg, and heart and lung auscultation re-

After recovery, the patient was admitted to coronary intensive care unit. He was monitored in emergency department until his mental status returned to baseline (normal). Serum creatinine kinase-MB and troponin I levels were slightly elevated at 72 U/L (normal range: 0–25 U/L), and 1.49 ng/mL (normal: ≤0.06 ng/mL), respectively. Thyroid function test was

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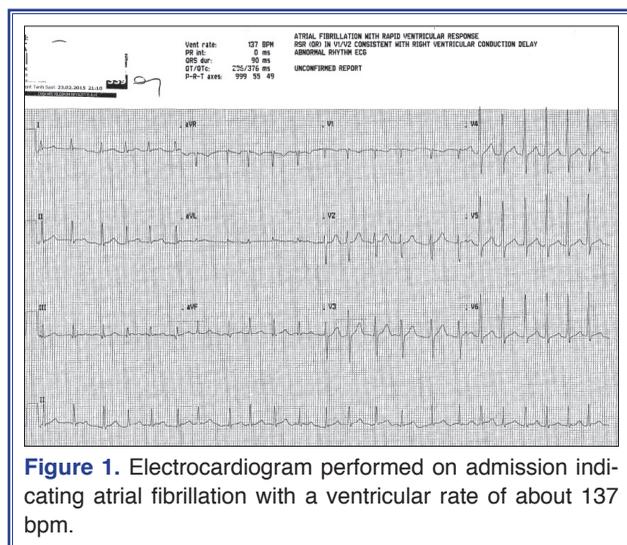


Figure 1. Electrocardiogram performed on admission indicating atrial fibrillation with a ventricular rate of about 137 bpm.

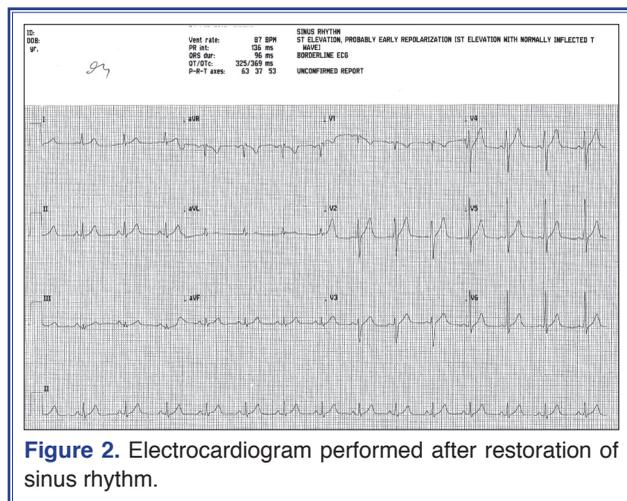


Figure 2. Electrocardiogram performed after restoration of sinus rhythm.

in normal range. Echocardiography showed normal cardiac structures and functions, and there was no evidence of pericardial effusion. Toxicological screening was performed, and no narcotic substance was detected in blood or urine. To rule out coronary heart disease, multi-slice computed tomography (CT) was performed before discharge. Report was normal. Cranial CT was performed as well, to rule out brain pathology, and result was normal. During the course of the illness, no other complication or symptoms were observed. The patient remained in sinus rhythm and was discharged from hospital uneventfully.

DISCUSSION

SCs are marketed under different names in several countries; the most widely used are “K2” and “Spice”

in Europe, and “Bonzai” in Turkey. Widespread use of SCs has become a major public health problem worldwide due to devastating effects. Popularity has risen due to easy access, not being detectable in urine and blood samples, and relatively low prices.

Delta-9-tetrahydrocannabinol (THC) is the main psychoactive component of marijuana, and SCs are analogues of THC. SCs are chemically synthesized in laboratory environment. SCs were first produced for medical treatment.^[1] Later, they began to be used for effects of euphoria, relaxation, and loss of inhibitions. Bonzai consists of varied mixture of herbal substances and SCs, and is consumed by smoking the mixture.

The human body has an endogenous cannabis system of 2 cannabis receptors, CB1 and CB2, including in the heart. The body produces endogen ligand anandamide, which causes reactions like those resulting from ingestion of THC or SCs. Endogenous cannabis system is thought to be identical to the endogenous opioid system, which modulates adrenergic system, but exact role is not precisely understood. SCs bind to CB receptors and act as THC. They are full agonists of CB receptors and have more potent psychotropic effect than marijuana.^[3]

Various cardiovascular events have been reported with marijuana use, including myocardial infarction, stroke, and arrhythmia.^[4-6] Increased heart rate is one of the most common effects of THC. Premature ventricular contraction, Brugada-like ST segment abnormalities, sinus bradycardia, ventricular tachycardia, and AF have been reported after cannabis use.^[4,7-9]

Data about effects of SCs on cardiovascular system are limited because SCs are relatively new. But given similarity to marijuana, effects are not difficult to predict. Cases of SC use reported have included ST segment elevation with normal coronary angiography, sinus bradycardia with severe hypotension, myocardial infarction,^[10] and stroke.^[11] There are limited data regarding arrhythmic effects of SCs. Accelerated junctional rhythm, left bundle branch block, and prolonged QT interval have been reported.^[12] Only 1 case of AF following SC use has been reported thus far.^[13]

Effects of THC on autonomic nervous system (ANS) are related to dose: Low-dose exposure causes increase in sympathetic tonus and leads to increase in blood pressure and tachycardia, and increase in cardiac output. Conversely, at high doses, bradycardia

and hypotension occur as result of sympathetic inhibition and increased parasympathetic activity. Sympathetic effects are dominant, such as increased blood pressure and heart rate. Hypotension and bradycardia have been reported only rarely.

One factor thought to be responsible for THC-induced arrhythmias is cardiac ischemia; increased heart rate and blood pressure may cause supply-demand mismatch and lead to arrhythmia. In addition, THC may reduce action potential duration as result of adrenergic stimulation, thus altering electrophysiological properties of myocardium and facilitating formation of micro-reentry and automaticity.^[14] THC may enhance conduction in atrial perinodal fibers, and thereby may promote atrial reentry, which precipitates AF in individuals who are sensitive to increased catecholamine release. There is close relationship with ANS cannabinoid system, thus imbalances in sympathetic and parasympathetic discharges influence atrial electrophysiological properties. In structurally normal hearts, AF may occur as result of increased vagal activity.^[15] In the presence of structural heart disease, it is thought to result from increased sympathetic activity.

Despite present case being a young patient, we could not exclude coronary heart disease due to slightly increased cardiac troponin level, and though there was no history of chest pain, coronary CT angiography was performed.

Management of SC intoxication usually consists of supportive and symptomatic treatment. Monitoring of heart rhythm and vital parameters must be considered in initial management, arterial blood gas should be obtained, and serum electrolyte level should also be measured. Although there is no specific antidote to THC or SCs, recently Aksel et al. treated patients with SC intoxication with intravenous lipid emulsion therapy, which may be promising treatment choice.^[12]

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