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Case Report

Cardiovascular side effects related with use of synthetic cannabinoids "bonzai" : two case reports

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Abstract

Information about the effects of synthetic cannabinoids "bonzai" on the cardiovascular system is limited. In this article, two patients in whom different cardiological side effects were observed following use of synthetic cannabinoids 'bonzai' were presented.

Our first patient who was a 16-year old boy presented to pediatric emergency department with severe chest pain which had started one hour before. On electrocardiographic examination, ST segment elevations greater than 3 mm were observed in DII, DIII, AVF and V5-V6 derivations which caused to suspicious myocardial infarction. Cardiac catheterization was performed and coronary angiographic findings were found to be normal. When the patient was questioned again, it was learned that he used synthetic cannabinoid 'bonzai'. The second patient who was aged 18 years and addicted to synthetic cannabinoid 'bonzai' was brought to our emergency department by his friends because of clouding of consciousness. Dopamine treatment was started in the patient whose cardiac apical beat reduced to 40/min and who was found to develop hypertension, because bradycardia worsened. However, the blood pressure increased rapidly and dopamine treatment was stopped. Heart rate and blood pressure monitoring was continued.

Use of synthetic cannabinoids 'bonzai' should be kept in mind in patients who present to emergency departments with chest pain and complaints related with the cardiovascular system. (Türk Ped Arş 2015; 50: 61-4)

Keywords: Synthetic cannabinoids, bradycardia, myocardial infaction

Introduction

Use of synthetic cannabinoids is gradually increasing in our country as well as in the whole world (1). In a study performed in USA in 2011, it was reported that 11% of high school students used marijuana or synthetic cannabinoid in the last 12 months (2). The reasons for synthetic cannabinoids to be popular include knowledge that they have marijuana like effects, easy accessability, inexpensiveness and inability to show usage by routine toxicological screening methods (3). The synthetic cannabinoids are called "bonzai" in our country because they are sold in packages with an emblem "bonzai" on the surface. They are sold under the name of "spice" in Europe and under the name of "K2" in USA. The most commonly used synthetic cannabinoids on drugs market include JWH-018, JWH-073, HU-210 and CP 47.497. These substances were included in the list of illegal substances with the decision published in the official journal on 02.13.2011 in Turkey. The most common side effects following use of synthetic cannabinoids include vomiting, dyspnea, tachycardia, bradycardia, hypertension, chest pain, myocardial infarction, anxiety, psychosis and acute renal failure (4). Information about the effects of synthetic cannabinoids on the cardiovascular system is limited because they are considerably new. In this article, two patients in whom different cardiovascular side effects were observed following use of synthetic cannabinoids'bonzai' have been presented.

Case 1

A 16-year old male patient who had no known disease previously presented to our emergency department with severe pressure-like chest pain behind the sternum which had started one hour before. In the history, it was learned that the patient had no known systemic disease, drug allergy, effort angina or dyspnea and fever and flu-like symptoms did not occur before chest pain. There was no pathology in the per-

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sonal or familial history. On physical examination, his general status was well and his consciousness was open. He was cooperated and his orientation was well. He had a body temperature of 37.6C0, a cardiac apical heart beat of 90/min and a blood pressure value of 120/70 mmHg. On cardiological examination, the heart sounds were found to be rhyhtmical, S1 and S2 were normal and no additional sound or murmur was heard. Other system findings were normal. On electrocardiogaphic examination, ST segment elevations (more than 3 mm) were observed on DII, DIII, AVF, V5-V6 derivations. Complete blood count, hepatic and renal function tests, electrolyte levels were found to be normal. The other laboratory findings were as follows: CK-MB: 42U/L (<25), Troponin I: 0.547 ng/mL (<0.014), fibrinojen:470 mg/dL (180-350), d-Dimer: 1.12 mg/L (>0.5). On echocardiographic examination, no structural problem was observed in the heart and left ventricular systolic functions (ejection fraction: 65%, shortening fraction: 32%) were found to be normal. Cardiac catheterization with the objective of primary percutaneous coronary intervention was performed in the patient who was found to have increased cardiac enzymes and whose electrocardiographic findings were compatible with inferolateral myocardial infaction. Coronary angiography was found to be normal (Figure 1) and reduction in contraction of the apical region was observed when contrast material was injected into the left ventricle. The patient was followed up in the coronary intensive care unit for three days and cardiac enzyme levels decreased in the follow-up (CKMB:17U/L, Troponin I: 0,007 ng/mL). Substance abuse was interrogated and it was learned that he smoked a cigarette containing synthetic cannabinoid "bonzai" given by friends. The patient was started to be followed up on an outpatient basis after his complaints improved and cardiac enzymes were normalized.

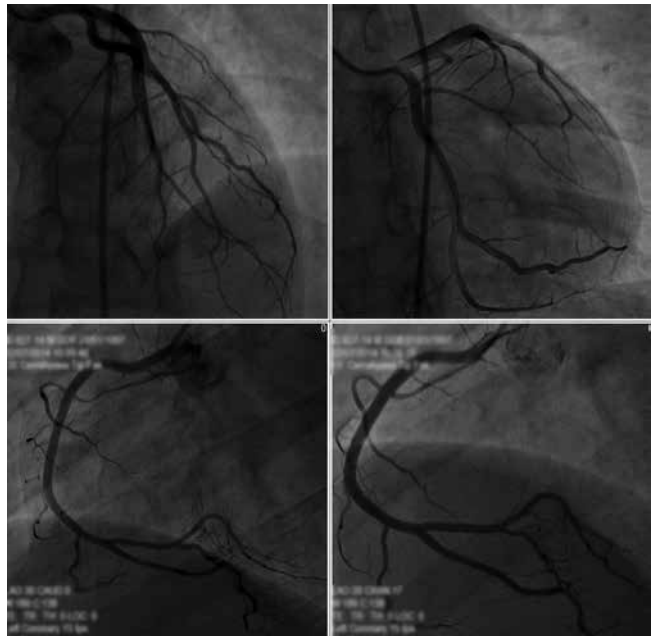

Figure 1. Selective coronary angiographic examination

Case 2

An 18-year old male patient who was a synthetic cannabinoid "bonzai" addict was brought to our emergency department by his friends because of clouding of consciousness. On physical examination, the general status was found to be poor, his consciousness was cloudy, he had poor cooperation and orientation, his pupils were myotic, direct/indirect light reflexes were bilaterally normal and his Glaskow coma score was found to be 8. He was internalized in our intensive care unit and mechanical ventilation was started. He was monitorized. His physical examination findings were as follows: body temperature: 36.0°C, heart rate: 50 beats/min, blood pressure 160/100 mmHg. The heart sounds were rhythmical, S1 and S2 were normal and no additional sound or murmur was heard. Other system findings were found to be normal. In the follow-up, bradycardia deepened and the heart rate decreased to 40/min. Although the patient had hypertension, dopamine treatment was started at a dose of 15 mcg/kg/min to benefit from its positive chronotropic effects. However, the dose of dopamine was gradually reduced up to 7.5 mcg/kg/min and discontinued because the blood pressure increased rapidly. In the follow-up, the heart rate increased to 60/min and the blood pressure was around 130/90 mmHg. Blood, urine and gastric content samples sent for toxicological examination were evaluated to be normal. When his friends were interrogated in detail, it was learned that he rolled synthetic cannabinoid "bonzai" in cigarettes and smoked. When his consciousness opened and spontaneous respiration started on the 25th hour of internalization in the intensive care unit, he was extubated. The patient who had agitation during hospitalizaiton in our ward was referred to the Psychiatry Ward.

Discussion

Synthetic cannabinoids are substances which were developed to benefit from the therapeutical effect of the endocannabinoid sytem. These substances show tetrahydrocannabinol-like effect by binding to the

cannabinoid receptors called CB1 and CB2. Tetrahydrocannabinol is the active ingredient in marijuana. CB1 and CB2 are found in many vital organs including mainly the peripheral and central nervous system, heart, liver, kidney and immune system. In the early 2000s, synthetic cannabinoids were started to be sold as an alternative to marijuana by spraying on dried plants following synthesis in the laboratory. "Bonzai" is a mixture of plants which contains multiple synthetic cannabinoids (5). The most commonly found cannabinoid in "Bonzai" is JWH-018, though different sysnthetic substances mixed in different ratios may be found in this mixture (5).

Our knowledge about the effects of synthetic cannabinoids on the cardiovascular system is limited. When the pathophysiology of myocardial infarction related with addictive substances was examined, a few mechanisms were observed. Cocaine leads to severe vasospasm. Information about marijuana which has similar properties as the sysnthetic cannabinoids and has been used for longer years and its active ingredient tetrahydrocannabinol gives us an idea about the effects of sysnthetic cannabinoids (2). Marijuana shows it action on the cardiovascular system by stimulating the sympathetic nervous system and blocking the parasympathetic nervous system. Oxigen requirement of the myocardium increases because of increased heart rate induced by the sympathetic nervous system and ischemia findings occur. In addition, vasoconstriction related with norepinephrine release as a result of stimulation of the sympathetic nervous system also contributes to occurence of myocardial ischemia findings (6). However, it is not clear which substance in 'bonzai' which is a synthetic cannabinoid causes to myocardial infarction. Bachs and Mørland (7) reported that they found normal coronary arteries in many cases of myocardial infarction related with use of marijuana. However, there are very few case reports related with development of myocardial infaction-like findings resulting from use of synthetic cannabinoid in the literature. Mir et al. (8) reported three patients who presented with chest pain which developed following use of synthetic cannabinoid in 2011 similar to our case. Although ST segment changes on ECG and increased cardiac enzymes were found in all these three patients, angiography revealed normal coronary arteries similar to our patient. Mckeever et al. (9) reported that they found normal coronary arteries on angiography in a 16-year old patients who was investigated because of suspicious myocardial infaction following use of synthetic cannabinoid. In two adult case presentations, myocardial infaction and sudden cardiac arrest following use of substance were reported in two patients who had known coronary artery disease (10). Although chest pain related with myocaridal ischemia is frequent in the adulthood, it is observed rarely in adolescents. In patients presenting with chest pain, interrogation of substance addiction should be kept in mind in addition to cardiac causes.

It has been reported that endogeneous cannabinoids including anandamide show negative inotropic and antiarythmical action by way of voltage-gated sodium channels and L-type calcium channels independent of sympathetic activity. In animal studies, synthetic cannabinoids have been reported to cause to bradycardia and especially HU-210 showed negative chronotropic action (11). Although tachycardia and hypertension are frequently found as a result of sympathetic stimulation, different ECG changes may be observed depending on the type and amount of the substance in the 'bonzai' mixture. Similar to our cases, Hermanns-Clausen et al. (12) reported tachycardia and bradycardia in 18 of 29 patients. Prolonged QT interval was found in the patient reported by İbrahim et al. (10). "Bonzai" may lead to very different clinical pictures in terms of the cardiovascular system. One of the most important reasons for this is the difference in the synthetic cannabionid mixture used. These substances which are synthesized under laboratory conditions may create different effects by way of different receptors. In addition, inability to detect the substances used in urine and blood samples most of the time renders the clinical approach more difficult. Patients who are suspected of being synthetic cannabinoids "Bonzai" addicts should be primarily evaluated in terms of consciousness and requirement for respiratory support. Intravenous access should be established and the patient should be monitorized in terms of tachycardia, bradycardia and arrhythmia. Evaluation in terms of myocardial ischemia should be performed and serum electrolytes, renal function tests and the blood levels of other substances which might cause to intoxication should be investigated. The patient should also be monitorized in terms of psychiatric effects.

With presentation of these cases we aimed to emphasize that synthetic cannabinoids "bonzai" addicts the number of whom increases gradually might present with very different cardiovascular system findings.

More studies related with the effects of use of synthetic cannabinoids "Bonzai" on the cardiovascular system are needed.

Informed Consent: Written informed consent was obtained from the parent of the patient who participated in this study.

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