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Case Report

A rare cause of fatal cardiac arrhythmia: Inhalation of butane gas

Utku Pamuk[1], Hazım Alper Gürsu[1], Serhat Emeksiz[2], Yasemin Özdemir-Sahan[1], İlker Çetin[1]

Departments of [1]Pediatric Cardiology and [2]Pediatric Intensive Care, Ankara Children's Hematology, Oncology Training and Research Hospital, Ankara, Turkey.E-mail: hagursu@yahoo.com.tr
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Butane gas, especially available in lighters, is commonly misused among adolescents and its side effects are rarely observed but serious. A 14-year-old male was brought to our emergency department. The electrocardiographic (ECG) examination showed biphasic T waves in leads V_4-V_6, and long QTc at 481ms. Echocardiographic study showed left ventricular systolic dysfunction. Troponin I level was found to be high at 9.1 ng/ml. Taking into consideration the patient's history, clinical and laboratory findings, ventricular fibrillation and myocardial injury resulting from butane gas inhalation was diagnosed.

Key words: cardiac arrest, echocardiography, myocard.

Butane gas, especially available in lighters, is commonly misused among adolescents. They, in particular, tend to abuse butane in their social circle. Cardiac side effects of butane such as myocardial infarction, ventricular fibrillation, acute myocarditis and sudden death are infrequent but can be mortal. We present a case of ventricular fibrillation and myocardial injury due to butane gas inhalation.

Case Report

A 14-year-old male was brought to our emergency department. It was reported that after diagnosis of ventricular fibrillation, the patient was intubated and resuscitated for about 15 minutes by ambulance staff. After restoration of spontaneous circulation, he was transferred to our hospital.

We transferred the patient to the intensive care unit. On physical examination, his body temperature was 36.5°C, heart rate was 136 beats/min, blood pressure was 100/60 mmHg. He was not spontaneously breathing. His Glasgow coma scale was 3. The electrocardiographic (ECG) examination showed biphasic T waves in leads V_4-V_6, and long QTc at 481 ms (Fig. 1). From his medical history, it was found out that he was not on any treatment leading to long QT and had no relatives with long QT. Echocardiographic study displayed left ventricular systolic dysfunction with low ejection fraction (33%) and low fractional shortening (14%). The cranial computerized tomography showed mild brain edema. Troponin I level was found to be high at 9.1 ng/ml (N: 0.04>). Other laboratory test results were BNP>35000 pg/ml (N: 0-100), creatinine kinase 2091 (N: 0-145), potassium: 3.8 mmol/L, Ca: 9.6 mg/dl, Hgb: 16.6 g/dl, WBC: 24200/mm^3, Plt: 291000/$mm.^3$ After three days of hospitalization his friends revealed that he had inhaled butane gas. Through the patient's history, clinical and laboratory findings, it was regarded that ventricular fibrillation and myocardial injury had resulted from butane gas. Though cardiac functions recovered after the treatments in intensive care unit, there was no progress in his neurological status. Brain death occurred and the patient died on 13th day of hospitalization. Toxicological testing could not be done due to late informing about butane gas.

Informed consent was received from the family.

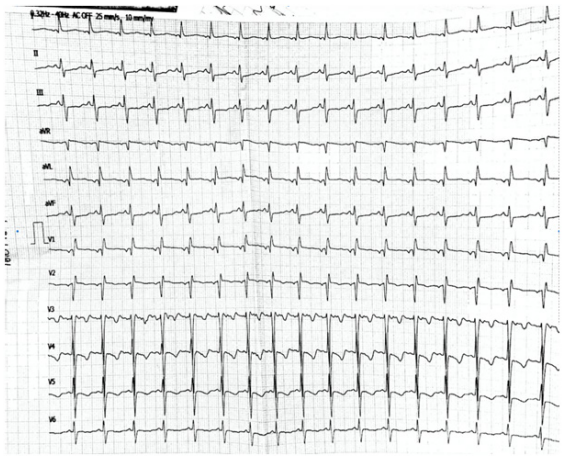

Fig. 1. The patient's 12-lead ECG.

Discussion

Volatile drug use for pleasure is common among young people. Butane gas is abundant in many legal products and is easily reachable. It can result in sudden death and serious side effects. Its addiction is common all over the world. Preceded by cigarette and marijuana it is a frequently abused substance.

Various factors create risks for volatile drug use such as problematic family relationships and low socioeconomic status.[1,2] Our patient was in a risky group because of his age and socioeconomic status. In his medical history, it was revealed that he had had a habit of inhaling butane gas before.

The inhalation of lighter gas can result in ventricular fibrillation. There are cases in which ventricular fibrillation develops after the inhalation of butane gas in existing literature.[3] Sen et al.[4], reported an 18-year-old male with ventricular fibrillation after the inhalation of butane gas. Butane gas instantly passes into the blood after its inhalation. It can cause fatal tachyarrhythmia's by increasing the sensitivity of heart to catecholamine's.[4] It also leads to myocardial infarction by vasoconstriction in coronary arteries. Our patient was considered to have myocardial injury leading to elevation of troponin I level, left ventricular dysfunction and ventricular fibrillation. There have been two cases reported in the literature with myocardial injury and ventricular fibrillation after inhalation of butane gas as in our patient[5,6]. Our patient's ECG showed prolonged QTc that was thought to have developed by the effect of hypoxia.

The habit of butane gas use can be minimized among young people by eliminating risk factors. It can cause serious and fatal effects. When myocardial infarction and life threatening arrhythmias are diagnosed in adolescents, butane gas inhalation as an underlying reason should be taken into account in patients with positive risk factors.

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