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Case report

# Triggering acute pancreatitis complicated with acute myocardial infarction by marijuana: a rare case report

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**Summary.** Marijuana is a widely used illicit substance among young adults and its abuse has been reported worldwide. Marijuana is a rare trigger of acute myocardial infarction and acute pancreatitis. We present a 25-year-old man with acute pancreatitis subsequently complicated by acute ST-elevation myocardial infarction (STEMI), which was associated with marijuana abuse. This case highlights the need and importance of awareness among public about this rare but potentially lethal adverse effect. Also, it draws attention when clinicians confront patients with history of substance abuse, they should be alert to the possibility of concurrent occurrence of serious medical conditions that may be adverse effects of substance use. Acute pancreatitis with concurrent acute STEMI is a rare situation but is a challenge for many emergency physicians, and it can lead to trouble outcomes if it not be quickly diagnosed and properly managed. We demonstrate successful management in this complicated patient with primary angioplasty. (www.actabiomedica.it)

**Key words:** acute pancreatitis, acute myocardial infarction, marijuana, substance abuse

## Introduction

Marijuana is one of a common psychoactive drug used worldwide, which is referred to as cannabis sativa. There has been a recent trend towards legalization and use of the drug for medical purposes, therefore, the usage of marijuana has been on the rise, particularly among young adults (1-4). Hence, it is important to better understand its impact on health outcomes.

Although marijuana users do experience side effects, many of them are not dangerous (5). Based on reports and studies, marijuana can be a trigger for adverse effects such as myocardial infarction and acute pancreatitis (6-9).

Acute pancreatitis complicated by acute myocardial infarction is a rare association.

We report a young male presenting with acute pancreatitis complicated by acute STEMI (caused by an acute thrombosis of the left anterior descending artery) associated with marijuana abuse.

According to increasing use of marijuana, clinicians encounter adverse effects of this substance more than before, so, a complete knowledge of them is needed to provide the best care.

## Case report

A 25-year-old man presented to our emergency department complaining of acute severe epigastric and left upper quadrant pain, with nausea and vomiting since 13 hours ago. The pain was progressive, constant and worsened with on presentation, he was agitated and diaphoretic.

The patient consumed alcohol and smoked cigarette sometimes but not taking any medications. He

had a family history of premature coronary artery disease in his father.

On further questioning, the patient revealed that he had used occasionally for some years a type of marijuana with the street name of 'Goal' (last consumption 6 hours before onset of symptoms).

His vital signs showed a blood pressure of 110/70 mm Hg, a heart rate of 43 beats per minute, a respiratory rate of 20 per minute & oxygen saturation of 95% in ambient air.

The jugular veins were normal and cardiac exam showed sinus bradycardia. On abdominal examination there was epigastric tenderness on light palpation with reduced bowel sounds. Rectal examination was normal.

Pulmonary examination was unremarkable. The admission electrocardiogram (Figure 1) revealed sinus bradycardia with no ST-T change.

Laboratory investigations revealed a mildly elevated white blood cell count (14x109/L) that was predominantly neutrophils (90%). Lipase and amylase were both elevated at 853 IU/L and 1003 IU/L, respectively (reference values: ≤60 IU/L and 10-90 IU/L, respectively). Other biochemical and hematological parameters were normal. In addition, serum cardiac enzyme levels were measured on admission and 2 hours thereafter that were within normal limits.

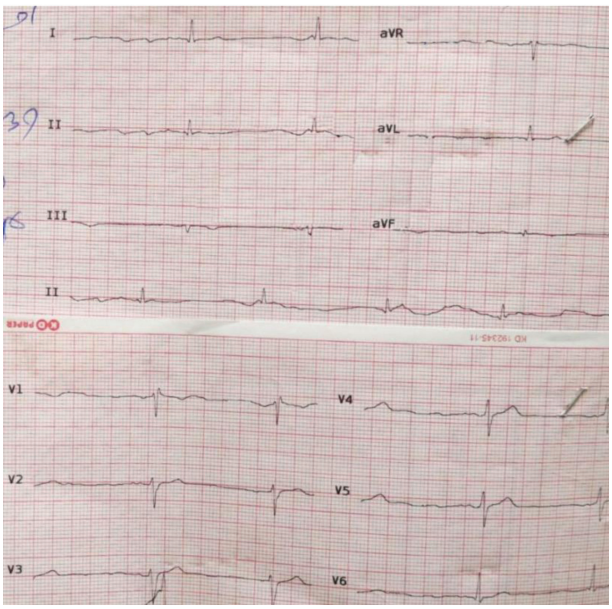


**Figure 1.** ECG shows sinus bradycardia and no ST-T change

Abdominal ultrasound showed non-dilated extra- and intrahepatic ducts; the pancreas could not be visualized sufficiently because of overlying bowel gas.

A computed tomography of the abdomen (Figure 2) was performed and revealed an acute pancreatitis with edema of the pancreas. no biliary dilatation or obstruction.

The treatment was started with nasogastric aspiration and intravenous fluid infusion.

The epigastric pain persisted and increased after 5 hours on admission. A 12-lead electrocardiogram (Figure 3) was taken again and revealed ST segment elevation in leads V3-6, I, II and aVF.

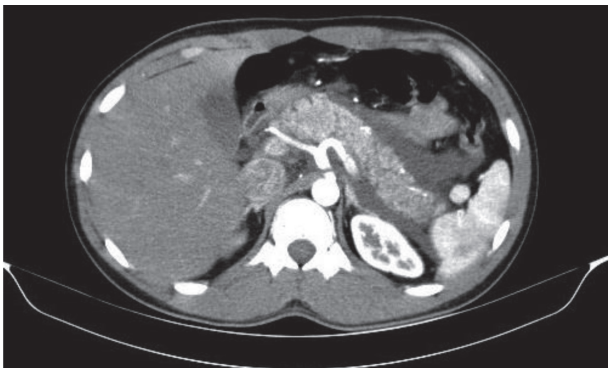

**Figure 2.** Computed tomography scan of the abdomen showing edematous pancreas with fat stranding and evidence of fluid collection

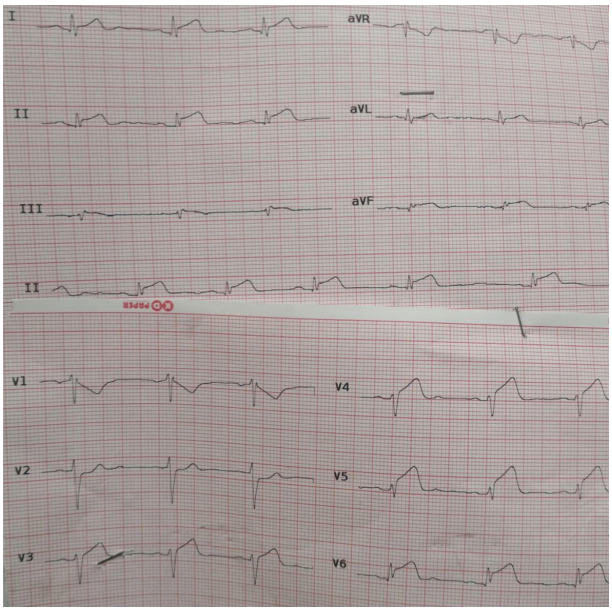


**Figure 3.** ECG shows ST segment elevation in leads V3-6, I, II and aVF

However, on close questioning, the patient did not give any history of chest discomfort.

Pulmonary and cardiac auscultation findings were normal.

In serial electrocardiograms, ST segment elevation developed. The diagnosis was hence re-adjusted to acute pancreatitis complicated by acute myocardial infarction. The loading dose of ASA and clopidogrel was taken but in view of the risk of hemorrhagic pancreatitis, thrombolytic therapy was withheld.

A final multidisciplinary decision was made to refer the patient to another institution for coronary angiography.

In other center, the patient was taken directly to the coronary catheterization unit. Figure (4) which showed a thrombotic lesion in the proximal left anterior descending (LAD) artery with Thrombolysis in Myocardial Infarction Grade III distally (Figure 4) and total thrombotic occlusion of the mid LAD with no distal flow. Left circumflex artery and right coronary artery were normal.

Aspiration thrombectomy was done, and distal artery flow was restored. Cardiac enzyme levels were elevated compatible with an acute myocardial infarction.

Patient's symptoms were markedly reduced after coronary intervention. Electrocardiogram showed the resolution of ST-segment elevation, inverted T wave in leads V2-6, II, aVF and without Q-wave.

A two-dimensional echocardiogram demonstrated an estimated ejection fraction of 50%, hypokinesia of mid-anterior and mid-anterolateral segments with normal left ventricular diastolic function.

After extensive consultations with gastroenterology service, the patient was treated with antiplatelet (aspirin 80 mg/day and subsequently, clopidogrel 75 mg/day) and anticoagulant (heparin infusion) agents, intravenous fluids and antibiotics.

There were no bleeding complications and a repeated computed tomographic scan showed acute pancreatitis with no evidence of necrosis and hemorrhagic changes. There was a fall in the pancreatic enzyme and serum cardiac levels.

An angiographic control 7 days later, revealed complete resolution of the proximal LAD thrombus.

The subsequent of the hospital course was uneventful. The patient was aware of the hazards of illicit substance use and was discharged on day 9.

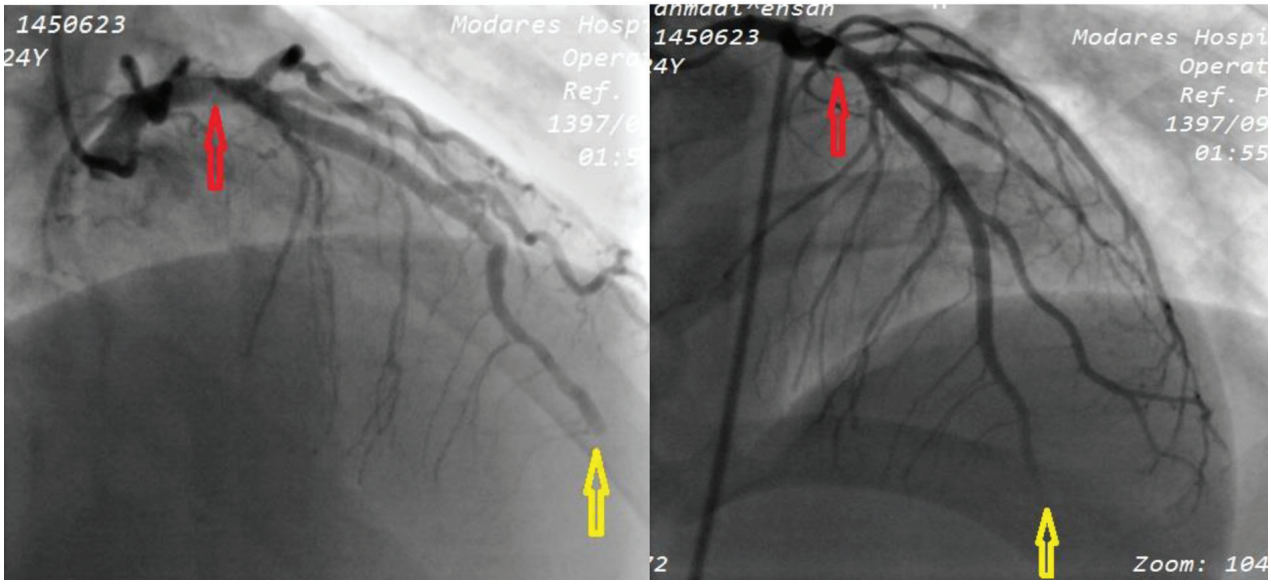


**Figure 4.** Coronary angiographic study showing, a filling defect (top arrow) in the proximal left anterior descending artery, suggestive of a thrombus and total thrombotic occlusion (bottom arrow) of the mid LAD with no distal flow

## Discussion

Marijuana, which is extracted from the plant Cannabis sativa, consists at least 60 separate chemical components (2). The effects of marijuana are mediated by the activation of receptors, which are present in the central nervous system, heart, adipose tissue, liver, lung, spleen, blood vessels, pancreas and adrenal gland (1, 2, 6, 10).

Marijuana is the most widely used illicit substance worldwide and the number of its users, especially among young people, has been increased over the past decade (3, 4).

It is known that marijuana has several side effects, such as breathlessness, nausea, vomiting, tachycardia, hypertension, chest pain and acute renal failure, however, its impacts on health status are not well understood and remain the subject of considerable debate (5).

Based on the recent tendency towards legalization and medical use of marijuana as a treatment option to increase sociability and produce euphoria, it is necessary to better understand Its health effects (9).

A few cases of adverse effects, such as acute STEMI and acute pancreatitis, have been published as a consequence of marijuana use in the literatures (3, 11-15). Since these complications are rare and there is not enough information about their underlying mechanism, we describe a case of 25-year-old male presenting with acute pancreatitis complicated by acute anterior STEMI associated with marijuana abuse.

Acute pancreatitis is an inflammatory disease with multisystem involvement. It is a common and serious disease with many known etiologies, including obstruction, alcohol and drug side effects. The use of marijuana has been reported as a rare cause of acute pancreatitis (8).

The active component in marijuana is tetrahydrocannabinol, which acts on cannabinoid receptors in the islet of Langerhans cells of the pancreas (10). In the human pancreas, effect of cannabinoid receptor activation on the course of pancreatitis is not fully clarified (16). In the present, the pathophysiology and mechanism of marijuana-induced pancreatitis is not well defined.

It is well understood that marijuana has pathophysiological effects on the cardiovascular and sympatho-adrenergic system, however, its use is not classically regarded as a risk factor for myocardial infarction. It is known that marijuana has several hemodynamic effects, such as changes in heart rate and blood pressure. These effects are probably mediated via stimulation of autonomic nerve system. In addition to the hemodynamic effects, marijuana use is associated with an increase in myocardial oxygen demand, a decrease in oxygen supply and change in platelet function (17-20).

Although some literatures have reported that harmful hemodynamic changes, coronary vasospasm and endothelial damage at the injury site of sensitive plaque might be trigger the development of myocardial infarction in marijuana users, very little is yet known about the association between the marijuana use and acute STEMI (7).

While the causal link between these rare harmful effects and marijuana is not exactly known, we present a very rare case in which acute pancreatitis complicated with acute STEMI was associated with marijuana use.

Regardless of etiology, acute pancreatitis complicated with acute myocardial infarction is a very rare condition, and it has rarely been reported in young adults.

The development of myocardial infarction in the present case can be explained by two probable mechanisms: 1, causal relationship between marijuana use and acute myocardial infarction and 2, as a complication of acute pancreatitis.

marijuana may give rise to acute myocardial infarction. Few previous studies have discussed that the procoagulatory effect of marijuana is the main mechanism of acute myocardial infarction. An enhanced oxidative stress, increased factor VII activity, activation and aggregation of platelets also play an important role in marijuana-induced myocardial infarction (21).

Acute pancreatitis can be associated with electrocardiographic changes, including ST-segment deviations and T-wave changes, that can mimicking acute myocardial ischemia (22, 23). However, true myocardial infarction complicating the course of acute pancreatitis has been reported in a few cases in the literatures (24, 25).

Acute pancreatitis is associated with a systemic inflammatory response, which triggers a variety of ab-

normalities in the hemostatic cascade and fibrinolytic mechanisms. Progression of hypercoagulable state may provoke arterial and venous thrombotic complications (26).

The electrocardiographic evidence of ST-segment elevation can be caused by conditions other than acute myocardial infarction (27). However, the present patient was regarded as a true case of acute STEMI based on electrocardiogram changes, cardiac enzyme levels and coronary angiographic findings, which could be as a complication of marijuana-induced pancreatitis.

The selection of treatment strategy for patient with myocardial infarction in the setting of acute pancreatitis is very important, especially considering the complications of thrombolytic therapy. Acute pancreatitis with concurrent acute STEMI is a challenge for treatment, what approach constitutes optimal management.

Mann et al (28) reported a case with diagnosis of acute pancreatitis, who died due to severe retroperitoneal hematoma related to the thrombolytic treatment. The result of study by White et al (29) also revealed that fibrinolytic treatment might be associated with an increased rate of developing hemorrhagic pancreatitis. So, acute pancreatitis could be considered as a relative contraindication for fibrinolytic treatment. Hence, coronary angioplasty is preferable to avoid the potential hazard of using thrombolysis. The safety of intracoronary or systemic administration of glycoprotein (GP) IIb/IIIa inhibitor during angioplasty is not well-known. Previous studies suggest that patients experiencing marijuana-induced myocardial infarction have lesser angiographic evidence of coronary atherosclerosis, therefor, thrombus aspiration by a catheter, is a well treatment option in this setting (30, 31).

This case illustrates that in the background of substance abuse, to assume a single diagnosis with no considering other adverse effects of substance use can be a blunder, hence, a high index of suspicion, definitive evaluation and proper diagnostic approach are necessary to avoid missing simultaneous presence of two complications or more related to the substance usage.

It should be kept in mind that the use of marijuana can be direct cause or trigger of simultaneous different events such as STEMI and acute pancreatitis in apparently healthy young persons. Therefore, in cases with history of substance abuse, physicians have to be alert that more than one side effect can simultaneously occur and they should consider the best approach.

**Conflict of interest:** Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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