

Rupture of Heart in a Cannabis Addict: an Autopsy Case Report

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ABSTRACT

Background: *Cannabis sativa* or *indica* also known as Indian hemp is most widely used illicit drug in the world in its various forms such as bhang, majoon, ganja, charas or hashis. It affects various systems of human body on virtue of its active principle i.e. delta-9 tetrahydrocannabinol (THC). Its effect on cardiovascular system such as dose dependant increase in heart rate, arrhythmia and increased occurrence of myocardial infarction are well known.

Case Report: In present case, a 42 years old male, addicted to ingestion of 'bhang' and suffering from psychiatric illness was brought to the hospital with history of headache and vomiting since last 12 hours. There was history of his violent behaviour, hence he was kept locked in a room for few hours and then relieved. He was treated for few hours and succumbed to death. On autopsy, patent coronaries and rupture of anterior wall of heart, in the vicinity of inter-ventricular septum was revealed.

Conclusion: To the best of our knowledge, no such case was found in the literature. Treatment of patients with history of cannabis addiction must be focused in the view of acute cardiac conditions.

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► *Implication for health policy/practice/research/medical education:* Rupture of Heart in a Cannabis Addict

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1. Introduction:

Cannabis sativa or *indica* also known as Indian hemp, grows wildly all over India but its cultivation is restricted by law (1). All parts except stem, roots and seeds, of this plant contain cannabinoid and canabidiol (1). These constituents of plant are inert

themselves but on exposure to heat are converted in very active isomeric delta-9 tetrahydrocannabinol (THC) (1). It is most widely used illicit drug in the world (1). It is used in various forms such as bhang, majoon, ganja, and charas or hashish. Bhang is prepared from the dried leaves and fruit shoots. It contains 15% of active principle. It is used as we use tea to prepare decoction. Fresh bhang is highly intoxicating. Cannabis has biphasic effect on autonomic nervous system, depending on the dose absorbed. It causes tachycardia at low doses while bradycardia and hypotension are

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observed at higher doses (2). In patients with ischaemic heart disease, cannabis increases frequency of angina symptoms at low level of exercise (2).

2. Case Report:

A 42 year-old male was brought to the hospital with history of headache and vomiting since last 12 hours. There was no history of hypertension or diabetes. On further history it was revealed that he was an addict to ingestion of 'bhang' and was suffering from some unknown psychiatric illness. Last consumption was approximately twelve hours prior to his arrival at hospital. He had violent movements the preceding day and hence was kept locked in a room for few hours and then relieved when he complained of headache and vomiting. There was no history of medication given to him. He was treated for a short while and succumbed to death. His body was sent for autopsy so as to find out cause of death.

On autopsy, he was an averagely built and averagely nourished male with rigor mortis well-marked all over the body. There was no any external injury, except the pinpoint puncture wounds over dorsum of both hands suggestive of intravenous line insertion. Postmortem lividity was present all over the back and buttocks, except over pressure areas and it was fixed.

Internal examination was done by 'I' shaped incision, from mentis to pubis. On opening thoracic cavity, in situ examination revealed bluish-red coloured pericardium. Lettulle's technique of *enmass* evisceration was used where all thoraco-abdominal organs were removed as a single mass and dissected outside. On carefully dissecting parietal pericardium, clotted blood was noted in pericardial sac. Blood clot weighed about 110 grams along with about 50 ml fluid blood. After removal of complete pericardium and clot from the site revealed a transmural rupture in anterior wall of left ventricle, 0.5 cm left lateral to inter-ventricular septum, measuring in size $3.5 \times 0.5 \text{ cm}^2$ cavity deep (Figure 1). The margins were blood infiltrated with thinned out edges. The surrounding area of about $4 \times 1 \text{ cm}^2$ of anterior wall of left ventricle was also thin and fibrous. Coronaries were

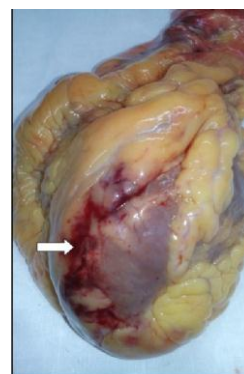


Fig. 1. Rupture of anterior wall of left ventricle. Note the infiltration of blood in margins and surrounding area indicating its antemortem nature.

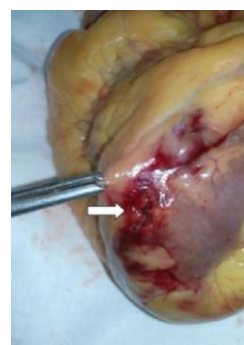


Fig. 2. Transmural rupture of anterior wall of left ventricle demonstrated by cutting through almost complete thickness and reflecting the cut end (curved arrow).

dissected by serial transverse sections from their origin at a distance of 0.3 cm each. All coronaries were patent throughout their course. Heart was dissected by short axis or ventricular slicing method, which confirmed the antemortem transmural rupture on virtue of its blood infiltration throughout the thickness (Figure 2).

Blood sample was collected and sent for analysis which confirmed presence of tetrahydrocannabinol (THC).

3. Discussion:

Cannabis after alcohol consumption is far the most commonly used recreational drug in Europe (3). It has biphasic effect on autonomic nervous system, depending on the dose absorbed (2). Low or moderated doses can increase sympathetic and reduce parasympathetic activity producing tachycardia and an increase in cardiac output. In contrast, higher doses inhibit sympathetic and increase parasympathetic

activity, resulting in bradycardia and hypotension (2). In patients with ischaemic heart disease, cannabis increases frequency of angina symptoms at low level of exercise (2).

Sotiris Athanaselis *et al* (3) have described various probable mechanisms of action of cannabis on heart which include, proarrhythmic effect due to release of catecholamine, cardiac ischaemia due to increase in heart rate and cardiac workload in susceptible individuals, postural hypertension, delay in seeking medical care for acute coronary events due to analgesic properties of cannabis, impaired oxygen supply to heart secondary to increased carboxyhaemoglobin level and production of oxidant gases by marijuana smoking resulting in cellular stress, which may heighten cardiovascular risk through activation of platelets, increased oxidised LDL formation, enhanced factor VII activity and induction of inflammatory response. Literature also revealed myocardial infarction in cases of cannabis abuse with normal coronary arteries. This was attributed to coronary vasospasm and increased oxygen demand to fulfil the raised heart rate and myocardial contractility (2-4).

Rupture of left ventricular free wall is most lethal but relatively rare complication of myocardial infarction accounting for about 10 to 15% hospital deaths (5). High mortality rate is due to sudden death secondary to pericardial tamponade (6, 7). Rupture of free wall usually occurs from 2 weeks or 3rd to 5th day of onset of infarction (5, 8). London and London (6) found in 1000 cases of rupture of heart, 50% ruptures occurred in 3 days and 89% within 14 days of infarction. Left ventricular rupture is eight times more common than right ventricle. Anterior wall of left ventricle was observed to be involved more commonly than posterior wall (9). Acute free wall rupture of heart complicating acute myocardial infarction was defined as an abrupt and transmural rupture of infarcted region causing cardiac tamponade and death within 30 minutes (5). Subacute rupture of heart was defined as gradual or incomplete rupture with slow and repetitive bleeding into the

pericardial sac (5). Rupture of heart itself is sufficient to cause death in ordinary course of nature.

In present case, the said deceased was a not a known case of any major illness such as hypertension or diabetes which rules out other compounding factors in myocardial infarction. Cannabis use in the form of ingestion of 'bhang' is the only predisposing factor. He was known to take it multiple times a day on regular basis. Last consumption was of 'bhang' was about 12 hours prior to the arrival at hospital. As per study done by London and London, 89% of rupture of heart occurs within 14 days of infarction, where it can be guessed that the process of myocardial infarction was started almost two weeks prior to death. Typically, all coronaries were patent. Repeated consumption of cannabis might have led to coronary vasospasm at various occasions adding to the ischemia of already infarcted part of the heart. Physical stress is known to aggravate process of myocardial infarction and eventually rupture of heart which was also noted in present case.

4. Conclusion:

In case of history of cannabis use even though occasionally, presenting symptoms suggestive of involvement of cardiovascular system, investigations should be directed to rule out not only myocardial infarction but also rupture of heart. If any patient with known cardiovascular ailment narrates history of cannabis abuse, he should be explained probability of having myocardial infarction and its complications. Cannabis addict should be treated properly and violent behaviour must be controlled with medications which is a precipitating factor for rupture of heart. If any deceased is brought for autopsy has history of cannabis addiction or use at multiple times in any of its forms, rupture of heart is to be suspected and autopsy should be performed with due precautions.

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