

Relationship between cannabis and acute myocardial infarction

Relación del cannabis con el infarto agudo de miocardio

To the Editor,

Ischemic heart disease is an uncommon clinical entity in young individuals. However, scientific evidence linking cannabis use in young patients without cardiovascular risk factors (CVRFs) to acute coronary syndrome is increasingly robust.

We present the clinical case of a 23-year-old man with no relevant medical history who presented to the hospital emergency department with a 3-hour history (at rest) of central, angina-like chest pain along with autonomic symptoms.

The patient acknowledged smoking an undetermined amount of cannabis in the hours preceding the onset of symptoms, which was confirmed by urine metabolite testing. Use of other toxic substances was ruled out. On arrival, he was hemodynamically stable and showed no signs of heart failure on physical examination.

He reported similar but less intense chest pain over the previous 2 weeks. He denied fever or infectious symptoms in the preceding days.

An electrocardiogram demonstrated sinus rhythm with ST-segment elevation in the anterior leads and reciprocal ST-segment de-

pression in the inferior leads. The STEMI protocol was activated for emergent catheterization. Coronary angiography revealed coronary artery disease with acute thrombotic occlusion of the mid-left anterior descending artery, with the remainder of the coronary tree free of obstructive lesions.

Successful revascularization was achieved with implantation of a drug-eluting stent. After admission to the coronary care unit, transthoracic echocardiography showed a left ventricular ejection fraction of 50.4% with apical hypokinesia. Initial blood work showed thrombocytosis at $663 \times 10^3/\text{mm}^3$, which normalized during follow-up.

High-sensitivity troponin kinetics showed a characteristic acute coronary syndrome pattern, peaking at 9,651 ng/mL (above the laboratory's upper reference limit). Lipid and glycemic profiles confirmed the absence of other CVRFs (total cholesterol, 139 mg/dL; LDL cholesterol, 88 mg/dL; glycated hemoglobin, 5.2%).

After the acute phase and percutaneous revascularization, the patient progressed favorably and was transferred to the cardiac rehabilitation unit to promote physical activity and reduce modifiable CVRFs such as substance use.

Given the patient's profile, a hematological evaluation was performed, ruling out prothrombotic or coagulation disorders, thrombophilia, and systemic inflammatory diseases. The patient was discharged with

the conclusion that the acute coronary event was attributable to recent cannabis use.

Young patients (< 50 years) with acute myocardial infarction (AMI) present a different cardiovascular risk profile—more frequently tobacco use, obesity, and dyslipidemia—than patients > 65 years with AMI.¹ Nonetheless, AMI in this population has been associated with cannabis and cocaine use.²

Cannabis is the most widely used illegal drug in Spain, according to the 2019/2020 National Survey on Alcohol and Drugs, particularly among young males. The mean age of initiation is 18.5 years, and up to 2.9% of respondents reported daily use in the previous 30 days.³

In recent years, the scientific community has evaluated the association between cannabis use and myocardial infarction (MI). A retrospective study collected patients between 2017 and 2018 with recent cannabis use and development of MI, compared with a control group.

The group of recent cannabis users, in a population under 44 years of age, had a higher risk of MI with an OR of 2.07 (95% CI, 1.12–3.82).² Another study in 3,882 patients with AMI, in which recent cannabis use was assessed, determined that those who had used cannabis within the 60 minutes prior to the event had a 4.8-fold increased risk (95% CI, 2.4–9.5) of presenting with AMI.⁴ Even in the work published by Mukamal *et al.* in 2008, a

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higher cardiovascular and non-cardiovascular mortality was found in patients exposed to cannabis in the week prior to having experienced an AMI.⁵

Other evidence has demonstrated the association between cannabis use and cardiovascular diseases.⁶ The 2 main chemical compounds of cannabis, or “cannabinoids”—delta-9-tetrahydrocannabinol and cannabidiol—exert their pathophysiological mechanisms primarily through the CB1 and CB2 receptors.

Although the cardiovascular effects of CB2 receptor activation are not well established, evidence has been found linking CB1 receptor activation with cardiovascular diseases.⁶

At low doses, the main effects occur through activation of the sympathetic nervous system, whereas parasympathetic stimulation predominates at higher doses. Sympathetic activation together with a higher proportion of carboxyhemoglobin in the blood generates an imbalance in myocardial oxygen demand. In addition, an environment of endothelial dysfunction and a pro-coagulant state is created, activating inflammatory pathways of atherosclerosis.⁶ Finally, cellular oxidation resulting from the formation of reactive oxygen species contributes to the pathogenesis of endothelial dysfunction and promotes arterial vasospasm.

Cardiovascular emergencies related to cannabis use range from acute coronary syndrome, arrhythmias, sudden death, and stroke⁶ to stress-induced

cardiomyopathy.⁷ Given the increasing use among young individuals without classic cardiovascular risk factors, cannabis and other substances constitute one of the main modifiable risk factors in these patients.⁸ There is also the possibility of underestimating this association because some synthetic forms may be undetectable in toxicology testing.⁷

An additional problem for this population, if cannabis use persists, is that they will have a higher cardiovascular risk than that estimated for their age and sex according to clinical practice scores and those recently published in European cardiovascular prevention guidelines.^{7,9} Moreover, AMI due to cannabis use has been associated with higher short-term mortality, attributed to delayed contact with health care services and the analgesic effect that masks symptoms.⁶

Of note, this population by conducting a thorough history directed at substance use. A targeted history in emergency departments would help correctly identify patients with higher cardiovascular risk.

In conclusion, given the increasing cannabis use in the population—particularly those younger than 50 years—both health care professionals and the general public should be aware of the cardiovascular risk associated with cannabis consumption. Our case represents a typical example of AMI in a young patient without cardiovascular risk factors due to cannabis use.

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Is a presentation of urinary tract infection and functional decline in the elderly the whole story?

¿Es todo infección de orina y declive funcional en el anciano?

To the Editor,

Urinary tract infection (UTI) is a highly prevalent diagnosis in emergency departments¹ and a frequent cause of functional decline in frail older adults—factors that contribute to the underdiagnosis of other clinical

conditions. We present the case of a patient initially diagnosed with UTI and functional decline with grim and a fatal outcome.

A 77-year-old woman with a past medical history of hypertension, long-standing atrial fibrillation (AF), and a 4-month history of cardioembolic stroke, which required mechanical thrombectomy and left a mild residual left hemiparesis, presented to the emergency department for fluctuating level of consciousness and urinary symptoms. At that time, transthoracic echocardiography had demonstrated severe left atrial (LA) dila-

tion (62.7 mL/m²). Her current medications were rivaroxaban (previously acenocoumarol), digoxin, and amlodipine.

She presented to the emergency department due to fluctuating level of consciousness and urinary symptoms. On physical examination, she was afebrile, hemodynamically stable, and had a positive right costovertebral percussion sign. No neurological examination was documented. The case was initially assessed as an acute pyelonephritis (APN), with abnormal urinalysis, leukocytosis of $28.08 \times 10^9/L$ with neutrophilia, and a CRP of 334 mg/L. IV ceftriaxone

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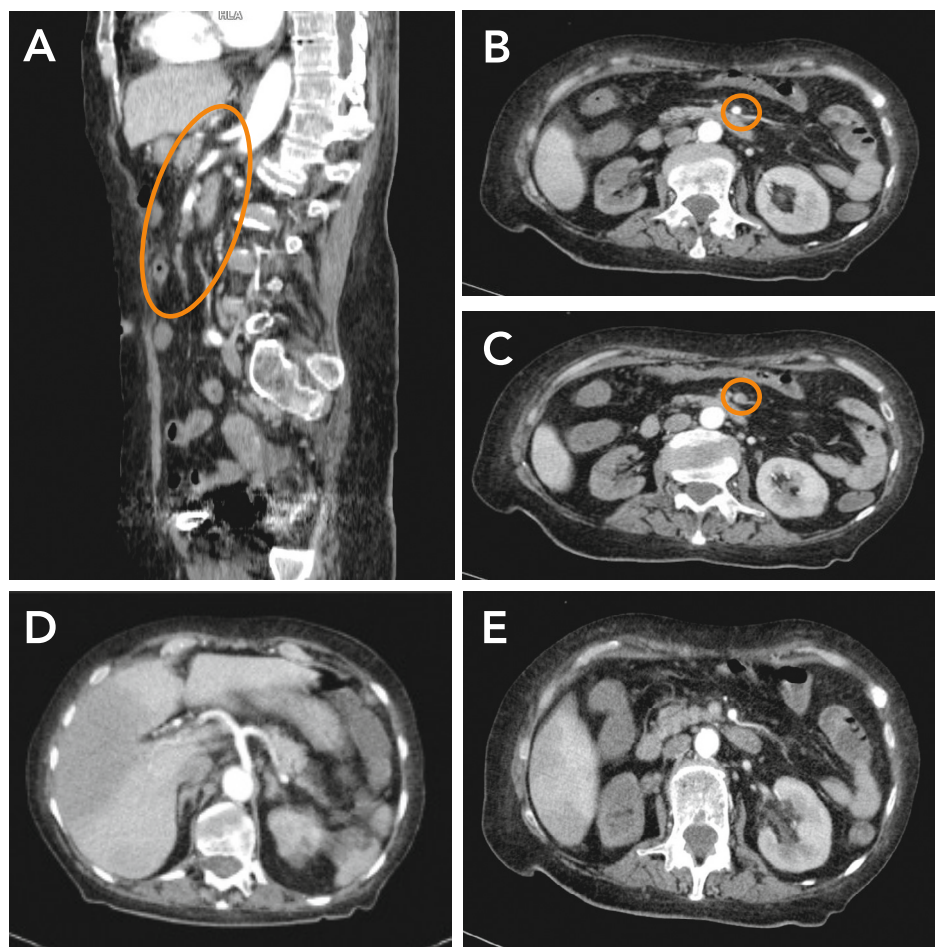


Figure 1. A) Thrombosis of the proximal third of the superior mesenteric artery. B) Patent superior mesenteric artery with contrast. C) Thrombosed superior mesenteric artery. D) Occlusion of the right hepatic artery with areas of hypoperfusion in the right hepatic lobe. E) Extensive right renal infarction in the subacute phase.

was started. A renal ultrasound was performed, which was normal.

On the Geriatrics ward, a repeat physical examination revealed left brachio-crural hemiplegia, and an MRI confirmed an acute–subacute focal infarct in the right posteromedial periventricular region. Forty-eight hours later, the patient developed general malaise, low-grade fever, melena, and acute ischemia of the left lower limb. Laboratory tests showed metabolic acidosis, leukocytosis, renal and hepatic failure, and elevated creatine kinase. An emergency abdominal computed tomography (CT) scan revealed the presence of intestinal ischemia with occlusions in several visceral arteries (superior mesenteric, right hepatic, and right renal), likely of cardioembolic origin, as well as poorly enhancing intestinal loops and right colon, an extensive right renal infarction (subacute), and areas of hypoperfusion in the right hepatic lobe (Figure 1). The patient died within the following hours.

Despite the low incidence rate of infradiaphragmatic visceral thromboemboli (IVTE) in AF,² studies have shown coexistence of cardioembolic stroke and asymptomatic IVTE in up

to 31% of these patients,³ with renal embolism being the most frequent and superior mesenteric embolism the most severe.⁴ Acute and chronic visceral infarctions may coexist. Diagnosis can be difficult because clinical presentation is often nonspecific or absent. Therefore, clinical suspicion is essential in a patient with acute/subacute stroke.⁵ Similarly, having a moderate-to-severe dilated left atrium (volume ≥ 42 mL/m²) is associated with the coexistence of IVTE and cardioembolic stroke.³

In our patient, the functional decline appears to correspond to a recurrent stroke and a renal infarction that mimicked APN, with subsequent clinical deterioration leading to death due to massive visceral embolism. We believe that when activating a Stroke Code for a cardioembolic stroke due to AF > 4.5 hours from symptom onset (with no fibrinolysis indicated due to elapsed time), it seems necessary to perform an echocardiogram. If a dilated left atrium with volume ≥ 42 mL/m² is confirmed, abdominal CT angiography should be considered urgently³ to rule out or confirm the possibility of IVTE and, if present, guide

appropriate management. In elderly patients, a UTI should not preclude consideration of other diagnoses based on prior medical history.

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Emergency Department visits for decompression sickness in breath-hold diving

Visitas a urgencias por accidentes descompresivos en el buceo en apnea

To the Editor,

The practice of diving is increasingly widespread. The Canary Islands (Spain), due to their location and climate, are an ideal place for its practice. Within this activity there are different sport–recreational modalities, which can be simplified into scuba diving using autonomous breathing equip-

ment and breath-hold diving (apnea).

When we speak of acute decompression sickness (DCS), we quickly associate it with scuba diving, assuming that it cannot occur in breath-hold diving. However, this condition had already been described among pearl divers from the Tuamotu Islands in French Polynesia, characterized by tremors, unsteadiness, vertigo, behavioral changes, paralysis, and death—known as Taravana, meaning “to become (tara) crazy (vana)” in the local language.

Although great depths are not usually reached and bottom times are only a few minutes, nitrogen inhaled at the surface dissolves in the blood and tissues according

to pressure gradients. The repetition of these short dives over long periods, with brief rest intervals at the surface, does not allow proper denitrogenation, leading to the accumulation of sufficient nitrogen for DCS to develop—similar to what occurs in scuba diving. In addition, the use of “torpedoes” or scooters that facilitate rapid descent and ascent has increased both the number of cases and the likelihood of developing DCS.

We conducted a retrospective review of decompression accidents related to breath-hold diving at *Hospital Universitario de Canarias*, Tenerife (Canary Islands, Spain)—a public referral center for diving accidents in the Canary Islands

equipped with a hyperbaric chamber with capacity for 10 patients and permanent on-call staff (physician, nurse, and chamber operator). We analyzed patients treated between 2012 and 2021.

Of the 198 patients evaluated, 9 (4.5%) were breath-hold divers, 8 of whom were men (88.9%). Six patients were transported by helicopter from other islands. The mean age was 37 years (SD, 9.5; range 25–58), with previous diving experience of 70.3 months (SD, 47.7; range 12–120). Mean dive depth was 18.6 meters (SD, 13; range 6–48). Total accumulated diving time was 166.7 minutes (SD, 67.2; range 90–270). Three patients had a previous decompression accident. Mean time from symptom onset to arrival at the emergency department was 1 hour and 7 minutes (SD, 113.32; range 1–4 hours).

One diver (11.1%) was diagnosed with type I DCS; 3 (33.3%) with type II DCS; and 5 (55.6%) with type II DCS with neurological symptoms. Eight patients (88.9%) were treated in the hy-

perbaric chamber. Five (62.5%) received a U.S. Navy Treatment Table 6 and 3 (37.5%) a Table 5. Only 1 patient required additional sessions (up to 7). No diver presented sequelae.

Although there are no precise data regarding diving activity in the Canary Islands, these islands receive 14 million tourists annually and have a resident population of 2.4 million. It is estimated that around 100,000 dives are performed per year, although the actual number is likely much higher. The scientific literature on breath-hold diving accidents is based primarily on Australian and Hawaiian series, where 144 deaths were recorded over 17 years.^{1,2,4} Many of those affected were considerably older than the patients in our series and had comorbidities—not identified in our cohort. Our data indicate an absence of mortality and minimal morbidity from this sport in the Canary Islands, likely related to the availability of a specialized treatment center and a rapid, efficient emergency transport system.

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Patient revisits to non-hospital Emergency Care Services

Revisitas de pacientes a un servicio normal de urgencias

To the Editor,

Within the urgent care chain, Out-of-Hospital Emergency Services (Normal Emergency Services – SNU –, Primary Care Emergency Services – SUAPs –, Continuous Care Points – PACs –, or their various names depending on the Spanish Autonomous Community) constitute the first link in the care pathway together with the Emergency Medical Systems (EMS). In some regions, the EMS are integrated into the organizational and care structure of the EMS. Health care personnel are usually not

part of primary care teams, and their position is labeled as primary care emergency physician/nurse. Another characteristic is their limited availability of diagnostic—and sometimes therapeutic—resources, although this limitation is gradually being mitigated by point-of-care technology.

The emergency return rate, or revisiting rate (patients who, after being assessed and discharged from the emergency service, return within the following 72 hours), reflects the effectiveness of these care services. To our knowledge, this return rate has not been specifically determined or evaluated in an EMS.¹

Therefore, we conducted a descriptive, observational, cross-sectional, retrospective study on revisits to two SNU centers on the island of Tenerife during January

2019. The study was approved by the relevant Ethics Committee (Code CHUC_2019_100). Demographic and clinical data were obtained from the electronic health record (DRAGO-AP), including discharge diagnosis and reason for reconsultation within 72 hours after the index visit. Two investigators reviewed whether each revisit corresponded to the same reason that prompted the initial visit. We selected the first 20 patients who attended the EMS at the beginning of each shift. We excluded pediatric patients, individuals temporarily residing from other regions, foreign non-residents, and traffic, occupational, and sports injuries.

A total of 1,240 patients were included, of whom 67 (5.4%) reconsulted for the same diagnosis within 72

hours after the initial EMS visit: 4.8% at the same EMS and 0.6% at the reference hospital emergency department. Mean age was 47 (± 19) years, with a similar distribution between sexes ($P = .49$). The main reasons for revisit were respiratory disorders (40%), GI disorders (20%), nonspecific symptoms and signs (19.4%), and urinary symptoms (8%). Additionally, 115 patients (9.3%) attended their scheduled appointment with their family physician.

We found no comparable studies in the scientific literature regarding revisits to primary care emergency services. Concerning hospital emergency departments, our revisit rate is similar to those reported in studies of atrial fibrillation revisits (5–15%^{2,3}) and to data from hospitals within the Andalusian Health Service (6.3%).⁴ This is noteworthy given the more limited diagnostic and therapeutic resources

available in the EMS vs hospital centers. Moreover, revisits in our series involved a younger demographic profile compared with Núñez *et al.*, where revisiting patients were predominantly older than 65 years.⁵

As part of the urgent care chain, EMS services play an important role, particularly in addressing likely low-severity conditions in the population and helping to rationalize hospital emergency demand.⁶ Despite the limitations of our study, the efficiency of the EMS appears adequate. Nonetheless, given these preliminary data, we believe that prospective, multicenter studies of at least one year are needed to evaluate seasonal pathology and incorporate additional variables that may influence emergency revisits.

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