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Case Report

Kounis Syndrome as a Cause of Myocardial Infarction with Nonobstructive Coronary Arteries

Justin Helberg, M.D.[1], Eric Acosta, M.D.[2]
[1]Hays Medical Center, Hays, KS
[2]Garden City Medical Center, Garden City, KS

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INTRODUCTION

Kounis Syndrome, also known as "allergic angina" and "allergic myocardial infarction," is a rare but increasingly recognized clinical entity characterized by acute coronary events triggered by allergic reactions. It was first described in 1991.[1] This syndrome encompasses a spectrum of acute coronary conditions, including angina, myocardial infarction, and stent thrombosis, all of which can be induced by various allergic insults.[1] Assessing the epidemiology of Kounis Syndrome poses challenges. In patients with signs and symptoms suggestive of myocardial infarction, approximately 15% exhibit no obstructive coronary artery disease. Among this group, 30-40% are believed to be associated with coronary artery vasospasm.[2-5]

Kounis Syndrome is believed to result from activation of mast cells and basophils during allergic reactions. These activated cells release inflammatory mediators, including histamine, tryptase, leukotrienes, and cytokines, which can lead to coronary vasospasm, endothelial dysfunction, and platelet activation. This process may result in myocardial ischemia and, in severe cases, infarction.[6,7]

CASE REPORT

A 55-year-old male with a medical history of hypertension, hyperlipidemia, obesity class III, and tobacco use disorder presented to the hospital with acute onset shortness of breath and left-sided chest pressure that woke him from sleep. Initially, he attempted to return to sleep but then experienced diffuse itching, sweating, nausea, and an episode of fecal incontinence. These worsening symptoms prompted him to call emergency medical services. Upon arrival at the emergency department, the patient was found to be tachycardic, tachypneic, and hypotensive. He appeared to be in respiratory distress, with diffuse redness and swelling of his hands and feet. Laboratory results showed leukocytosis with elevated lymphocytes, acute kidney injury, high anion gap metabolic acidosis due to lactic acidosis, and an elevated D-dimer at 0.74 mcg/mL (normal < 0.5 mcg/mL). Troponin-T was mildly elevated at 0.09 ng/mL (normal < 0.01 ng/mL). The initial electrocardiogram showed diffuse ST segment depression with isolated ST segment elevation in aVR (Figure 1). A Code STEMI was initiated, and the patient underwent emergent left heart catheterization.

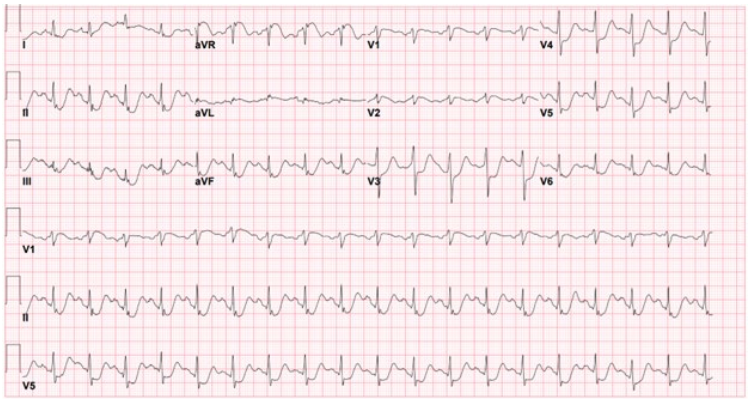

Figure 1. Electrocardiogram illustrated diffuse ST segment depression with isolated ST segment elevation in aVR.

Left heart catheterization revealed angiographically normal coronary arteries, while a bedside echocardiogram showed a preserved left ventricular ejection fraction (LVEF) and normal valvular function, but a dilated right ventricle. A STAT Computed Tomography Angiography (CTA) did not show evidence of pulmonary embolism or acute pathology.

The patient was transferred to the Intensive Care Unit (ICU) for further evaluation and management. Despite receiving 3 liters of intravenous fluid resuscitation, the patient remained hypotensive and was started on norepinephrine. A formal echocardiogram confirmed a LVEF of 65% with no regional wall motion or structural abnormalities. Concern for Kounis Syndrome was raised, and a tryptase level was obtained. The patient was started on intravenous solumedrol and antihistamines.

The patient responded rapidly to treatment with no residual symptoms and was discharged home with an EpiPen within 48 hours. The tryptase level returned elevated at 50.1 mcg/L (normal < 11 mcg/L). The patient was informed and referred to allergy and immunology for further testing. The inciting agent was believed to be the patient's new laundry detergent, which was discarded by his family prior to discharge. Since returning home, the patient has been doing well with no recurrence of symptoms.

DISCUSSION

For patients presenting with chest pain and ST-segment elevation on ECG, the differential diagnosis is comprehensive and includes conditions such as ST-segment elevation myocardial infarction (STEMI), spontaneous coronary artery dissection (SCAD), coronary artery anomaly, Takotsubo syndrome, pericarditis, myocarditis, microvascular angina, pulmonary embolism, coronary vasospasm, and demand ischemia related to systemic illness. Rapid differentiation is crucial, and coronary angiography serves as a valuable tool in guiding clinical care.

Kounis Syndrome, characterized by acute coronary vasospasm induced by allergic reactions, is often underdiagnosed. In our case, the patient exhibited typical features of cardiac chest pain, risk factors suggestive of underlying coronary artery disease, and ST-segment changes

on the ECG, raising concerns about left main disease. Coronary angiography effectively ruled out acute coronary syndrome, SCAD, coronary artery anomaly, and Takotsubo Syndrome. Provocative testing during angiography was not conducted. CTA was performed to eliminate pulmonary embolism as the cause of the patient's presentation. Considering the patient's systemic symptoms, including dermatological changes and hypotension, anaphylaxis causing coronary vasospasm was considered. Elevated tryptase levels later confirmed Kounis Syndrome as the likely etiology of the patient's presentation (specificity 92.3-94.4%).

The clinical presentation of Kounis Syndrome is highly variable, ranging from mild angina to life-threatening myocardial infarction. Symptoms may include chest pain, dyspnea, and various allergic manifestations such as skin rashes, urticaria, and bronchospasm. Patients may have a history of allergies, but Kounis Syndrome can also occur in individuals without prior allergic sensitization, as in our patient.[6,7] Three types of Kounis Syndrome have previously been described in the literature.[8] The types are subdivided based on whether there is an underlying coronary artery culprit lesion or stent (Table 1).

Table 1. Types of Kounis Syndrome.

Type 1	Patients with normal coronary arteries without underlying coronary artery disease.
Type 2	Patients with an underlying atheromatous disease.
Type 3	Patient with a previous coronary artery stent that experience stent thrombosis secondary to an allergic reaction.

The diagnosis is based on clinical history, electrocardiography (EKG) changes, elevated cardiac biomarkers, and coronary angiography. EKG findings may include ST-segment elevation or depression, and angiogram may reveal normal coronary arteries, coronary vasospasm, or even thrombotic occlusions. Treatment involves management of the underlying allergic reaction and the cardiovascular consequences. This may include antihistamines, corticosteroids, and, in severe cases, vasodilators like nitroglycerin. In theory, beta blockers should be withheld given the risk of potentiating vasospasm from unopposed alpha-adrenergic action. Cardiac interventions, such as angioplasty and stenting, are reserved for cases of confirmed coronary artery involvement.

The prognosis of Kounis Syndrome varies depending on the severity of the allergic reaction and the extent of coronary involvement. With prompt recognition and appropriate management, most patients experience complete recovery. However, delayed diagnosis or severe coronary artery involvement can lead to adverse outcomes.[8-11] For patients without underlying obstructive coronary artery disease and/or without high-risk sequelae such as life-threatening arrhythmias or myocardial infarction, the long-term survival and prognosis are favorable. Most of these patients do not necessitate extended follow-up. However, individuals with underlying coronary artery disease or those who have experienced high-risk sequalae can benefit from guideline directed therapy to mitigate the risk of future events.[12]

CONCLUSIONS

Myocardial infarction with nonobstructive coronary artery disease is a complex condition requiring comprehensive evaluation and management. This case demonstrates a Type I presentation of Kounis Syndrome in a middle-aged male, contributing to the understanding of this underdiagnosed condition. Kounis Syndrome highlights the intricate relationship between allergies and the cardiovascular system.[7] Recognizing allergic triggers in acute coronary events is crucial for timely diagnosis and effective management.

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