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Kounis Syndrome: A Stinging Case of ST-Elevation Myocardial Infarction

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Kounis syndrome is not a rare but an infrequently diagnosed non-thrombogenic cause of angina or myocardial infarction triggered by the release of inflammatory mediators following an allergic or anaphylactic reaction. This so-called “allergic angina” is seen in the setting of anaphylactic reactions and is believed to be due to mast cell release causing coronary vasospasm. The treatment of such cases is often with epinephrine, which has also been described in the literature as another rare cause of coronary vasospasm. We present a case of Kounis syndrome seen in a 46 year-old male who suffered two bee stings while landscaping in his yard. He developed an anaphylactic reaction and was promptly treated with IM epinephrine injection by paramedics at arrival and developed marked ST elevations on EKG in the inferior leads with reciprocal ST depressions in the anterior leads. His troponin peaked at 13 ng/mL and tryptase level was 15 ng/mL (normal <10 ng/mL). Coronary catheterisation showed non-diseased coronary arteries and a normal ejection fraction without evidence of vasospasm. He was afterwards treated with an epinephrine drip for distributive shock. Interestingly this syndrome was not provoked when re-challenged with this therapy, suggestive of an allergic reaction rather than epinephrine as the aetiology of his presumed vasospasm. This patient’s ST segment elevation and troponin elevation was due to Kounis syndrome. Awareness that anaphylactic reactions can lead to Kounis syndrome can lead to prompt appropriate treatment for this life threatening condition.

Keywords

Myocardial Infarction • Anaphylaxis • Hypersensitivity • Epinephrine • Hymenoptera

Introduction

Kounis syndrome, first described by Dr. Nicholas Kounis, was thought to be the coincidental occurrence of chest pain and allergic reactions accompanied by clinical and laboratory findings of classic angina pectoris caused by inflammatory mediators released during the allergic insult [1]. This condition was then termed “allergic angina” and eventually defaulted to “allergic myocardial infarction” [2]. The incidence of Kounis syndrome is not known due to a lack of reliable reporting. In a recent review published by Kounis himself in 2006 a world literature search revealed 150 cases of which 26 were caused by hymenoptera stings. However,

many Kounis syndrome cases likely go un-reported or unrecognised [3]. We present the unusual case of Kounis syndrome, seen in a young patient with an anaphylactic reaction to two bee stings.

Case Report

A 46 year-old male without known medical or food allergies, was working in his yard when he unexpectedly was attacked by two bees. Witnesses saw him become wobbly, vomit and fall over. Paramedics were called and arrived to find him unresponsive in a state of angioedema. Immediately, 0.3 mg

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Intra-Muscular (IM) epinephrine and solu-medrol was administered and the patient was attempted for emergent intubation, although unsuccessful.

At his arrival to the emergency room (ER), he was quickly fluid resuscitated after being found with bradycardia and hypotension. Cardiac monitoring and EKG in the ER demonstrated ST segment elevations in inferior leads (Figure 1). The patient became bradycardic with a heart rate into the 30s and eventually became pulseless. Advanced Cardiac Life Support algorithm was then initiated. Return of spontaneous circulation occurred after several rounds of CPR, 1 mg of atropine and 1 mg of epinephrine. He was placed on the hypothermic protocol and transferred to the cardiac catheterisation laboratory for emergent intervention. Selective bilateral coronary angiography did not demonstrate any flow limiting disease. His ejection fraction was within normal limits and no vasospasm was detected during the procedure.

Blood tests revealed elevated levels of tryptase at 15 ng/mL (normal 2-10ng/mL). Troponin was initially within normal limits (<0.2 ng/mL) but eight hours later peaked at 13.9 ng/mL then decreased to 9.6 ng/mL at 16 hours after presentation. ST segment elevation was evident on telemetry strips leading up to his coronary catheterisation. After coronary catheterisation an epinephrine drip was initiated to manage the patient's distributive shock. He was transferred to the intensive care unit where he was eventually weaned off mechanical ventilation and other supportive measures including the epinephrine drip, H1 and H2 blockers and IV solu-medrol. He was discharged home in good health four days after admission with a prescription for epi-pens. Two bee stingers were removed: One from patient's anterior chest and one from his back. The patient's family reported he

had a history of bee stings in the past, but oddly has never had a reaction before.

Discussion

Kounis syndrome is defined as acute coronary syndrome triggered by the release of inflammatory mediators such as histamine or tryptase in the setting of an allergic reaction [4,5]. There are two variants of the syndrome. Type I occurs in patients with normal coronary arteries, who have no pre-disposing risk factors for coronary artery disease. It is the inflammatory mediators of an allergic reaction that cause vasospasm accompanied by elevated levels of myocardial biomarkers. Type II occurs in patients with pre-existing atherosclerotic coronary artery disease who also get vasospasm caused by inflammatory mediators with normal cardiac markers or rupture of the coronary plaque leading to subsequent myocardial infarction [3]. As seen with our patient, he likely suffered from Type I Kounis syndrome as his cardiac catheterisation did not demonstrate any coronary artery disease.

The mechanism of coronary artery involvement in anaphylactic reactions likely involves mast cell degranulation. There is also evidence that mast cells both enter the area of plaque rupture or erosion but that they also release their contents before an actual coronary episode [4,5]. Examinations of coronary arteries from patients who died of acute myocardial infarction showed mast cell degranulation was 200 times higher in areas of plaque rupture or erosion than in adjacent areas in one study [6]. Other cell types have also been implicated in Kounis syndrome through their release of inflammatory cytokines including eosinophils which have been

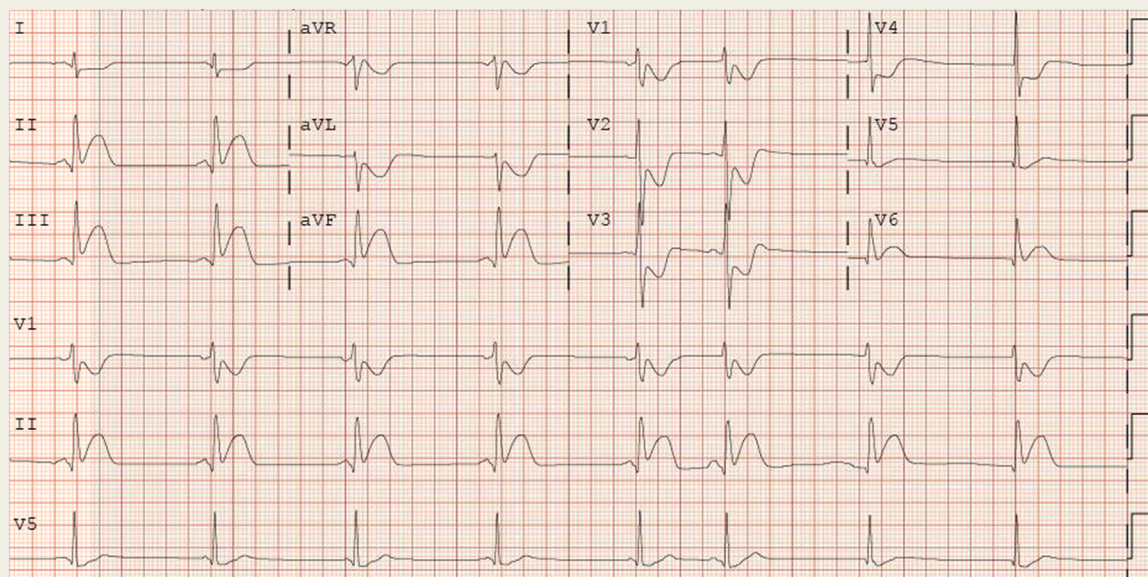


Figure 1 12-Lead ECG obtained in the Emergency Department.

reported to cause vaso-spasm and possibly even platelets in the setting of heparin induced thrombocytopenia as suggested in one case report [7,8].

The treatment of Kounis Syndrome is debated in the literature [9]. On the one hand the initial injury occurs due to an anaphylactic reaction and has been shown to involve mast cell degranulation within the coronary arteries directly leading to vasospasm [4–6], which would be treated with epinephrine along with the acute anaphylaxis for which epinephrine is the drug of choice [10]. On the other hand vasospasm caused by epinephrine has been described and shown to lead to myocardial infarction on its own [8]. Our patient was treated with epinephrine for his allergic reaction, and was re-challenged with epinephrine after his coronary catheterisation without adverse events. In a recent 2012 case report, authored by Dr. Kounis, intra-muscular epinephrine use was recommended [10]. Other experimental treatment modalities based on blocking IgE, interleukin, or other mediators of allergic reactions have been suggested [3]. Coronary catheterisation remains a useful tool when characterising Kounis Syndrome and excluding other aetiologies of ST elevation in this setting. We therefore recommend the use of epinephrine for the treatment of Kounis syndrome after coronary angiography has excluded other sources of ST elevation myocardial infarction.

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