

# Kounis Syndrome Triggered by Jellyfish Sting in a 53-Year-Old Male: A Case Report

Abdullah Al-Ghamdi<sup>1,2</sup>

<sup>1</sup>Department of Emergency Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

<sup>2</sup>Department of Emergency Medicine, Centre Hospitalier Universitaire de Nice, Nice, France

Email: Dr.alghamdi07@gmail.com

**How to cite this paper:** Al-Ghamdi, A. (2024) Kounis Syndrome Triggered by Jellyfish Sting in a 53-Year-Old Male: A Case Report. *Open Journal of Applied Sciences*, 14, 3562-3568.

<https://doi.org/10.4236/ojapps.2024.1412233>

**Received:** November 26, 2024

**Accepted:** December 14, 2024

**Published:** December 17, 2024

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## Abstract

**Background:** Kounis syndrome is a typically life threatening but very rare clinical entity that is characterized by coronary artery vasospasm and myocardial damage in the setting of allergic reactions including those caused by environmental stimuli. While jellyfish stings are familiar with provoking local allergic reactions, systemic encroachment including Kounis syndrome is extremely rare. **Case Presentation:** A 53-year-old male, apparently healthy and a regular swimmer reported to clinic with hypotension, increased troponin levels, and mild transient chest pain, after a sting from a jellyfish while swimming. The patient had a previous reaction to a jellyfish sting but no history of CAD, coronary artery disease. The first steps in managing the case were providing corticosteroids to stabilize the patient as well as antiplatelet therapy administration. Coronary angiography done later did not show any significant coronary artery stenosis making it clear that the patient had Kounis syndrome, Type I where products of an allergic reaction were leading and not coronary artery disease. **Conclusion:** The present case demonstrates the occurrence of Kounis syndrome after envenomation by jellyfish, emphasizing the possibility of allergy in patients with cardiovascular and allergic complaints. If the condition is recognized at an early stage and there is proper administration of steroids and or antiplatelets then the results are good. More studies are required for understanding how Kounis syndrome occurs and instead of recurrent allergic reactions on heart.

## Keywords

Kounis Syndrome, Allergic Angina, Jellyfish Sting, Myocardial Injury, Anaphylaxis, Coronary Syndrome

## 1. Introduction

Kounis syndrome is an understudied but clinically important condition wherein an allergic or hypersensitivity response leads to coronary vasospasm or potentially myocardial infarction. First described by Kounis and Zavras in 1991, this syndrome can be classified into three variants based on the underlying cardiac pathology: vasospastic angina pectoris, type I acute myocardial infarction and stent thrombosis [1]. It is more specialized than the previous cases and includes such phenomena as the activation of the mast cells, the release of histamines, the coronary artery vasospasm and sometimes plaque rupture [1]. Foods, drugs, insect sting and environmental substances that are known to cause Kounis syndrome include: fish, shellfish, fruits, vegetables, and canned food.

In this case report, we describe a 53-year-old man who experienced Kounis syndrome following jellyfish envenomation. Jellyfish sting can cause pain and skin rash at the site of contact or may cause slight allergic reaction systemic involvement, cardiac involvement is rare [2]. There are three main aims of this case report: firstly, to present the case and analyze its clinical, diagnostic and therapeutic aspects; secondly, to explain the nature of Kounis syndrome concerning the jellyfish stings and their pathophysiology.

## 2. Case Presentation

A 53-year-old man, being a regular swimmer and with no significant past medical history except an allergic reaction following a jellyfish sting a few years prior to the current presentation, lost consciousness while swimming and was brought to the Emergency Department (ED) following malaise. A jellyfish stung the patient on his right arm during swimming but he swam for further 5 - 10 min after stinging as a result of which he developed weak feeling and went onshore. The patient was found collapsed on the shore of the River with head injury and multiple bruises on his legs and arms by the fire fighters after he was rescued. After waking up, the patient could not recall all the incidents that have occurred at all during the operation or while unconscious.

### 2.1. Initial Medical Response

When the emergency medical services arrived, no signs of chest pains or rash were observed, the man only complained of minor breathing problems and possible aspiration of seawater. The patient also reported a specific episode of diarrhea saying that this was quite like another incident after he had been stung by jellyfish. The initial assessment on the scene revealed that he had a blood pressure of 120/80 mmHg, GCSR of 14, oxygen saturation of 92% and respiratory rate of 15 breaths per minute. Oxygen was then given through the face mask 6LPM which was later decreased to 2 LPM. There had been a similar episode of fatigue and syncope in the earlier years after stinging by a jellyfish with the same complaint of diarrhea. Since the two episodes were almost similar, the patient was transferred to the ED for further assessment.

## 2.2. Emergency Department Assessment

On presentation in the ED the patient was fully awake, responding appropriately to questions and able to locate him or herself in time and place. His clinical features only on admission to the hospital were: His blood pressure was 92/51 mmHg, a pulse of 61 beats per minute, a respiratory rate of 15 breaths per minute and an oxygen saturation of 97%. The physical examination revealed the following findings: The physical examination revealed the following findings:

**Cardiovascular examination:** The phenomenon in question will consist of occasional, normal, regular noises of the heart without murmurs. Peripheral pulses were feasible; no swelling or tenderness in the calves; no oedema in the lower limbs.

**Pulmonary examination:** There was no wheezing, crackles/rales anywhere there were bilateral vesicular breath sounds audible. Patient was fully coordinated, Alert, Oriented and spontaneous and not dyspnoeic, even at rest, comfortable in the room air.

**Neurological examination:** There were no signs of focal motor and sensory abnormalities. Cranial nerves were normal, and both pupils were equal and reactive to light. Compliant to this, there was no observed nystagmus or tremor in the patient besides no neck stiffness as would be expected in this condition.

**Gastrointestinal examination:** Abdomen was hypoactive, there were no signs of tenderness and distension and the sounds from the gut were also normal.

**Trauma assessment:** The patient had a simple, neat, longitudinal incision of about 4 cm on the forehead and therefore was amenable to suturing. He also had other scrapped areas at the front of his lower legs, around his left abdominal area and the right arm. There was no evidence of pain or erythema when assessing the spine, thorax or pelvis and no definite motor or sensory impairment was elicited.

## 2.3. Initial Investigations

The patient underwent an electrocardiogram (ECG), which revealed sinus rhythm with fine QRS complexes and no evidence of repolarization abnormalities. His heart rate at the time of the ECG was 66 beats per minute. Laboratory tests were performed upon arrival, including a complete blood count (CBC), electrolyte levels, and cardiac biomarkers as shown in (Table 1). The initial laboratory results were as follows:

**CBC:** Hemoglobin 15 g/dL, platelets 324,000 cells/ $\mu$ L.

**Electrolytes:** Sodium 144 mmol/L, potassium 4.77 mmol/L, bicarbonate 16 mmol/L.

**Inflammatory markers:** White blood cell count 11,000 cells/ $\mu$ L without elevated C-reactive protein (CRP).

**Cardiac markers:** Troponin I was elevated at 121 ng/L on arrival.

**Arterial blood gas (ABG):** pH 7.35, pCO<sub>2</sub> 30 mmHg, pO<sub>2</sub> 69.9 mmHg, HCO<sub>3</sub> 17 mmol/L, lactate 4 mmol/L.

**Table 1.** Summary of initial laboratory findings.

Test	Result	Reference Range
Hemoglobin	15 g/dL	13.5 - 17.5 g/dL
Platelets	324,000 cells/ $\mu$ L	150,000 - 450,000 cells/ $\mu$ L
Sodium	144 mmol/L	135 - 145 mmol/L
Potassium	4.77 mmol/L	3.5 - 5.1 mmol/L
Bicarbonate	16 mmol/L	22 - 28 mmol/L
Troponin I (on arrival)	121 ng/L	<14 ng/L
White Blood Cell Count	11,000 cells/ $\mu$ L	4500 - 11,000 cells/ $\mu$ L
Lactate	4 mmol/L	0.5 - 2.2 mmol/L

#### 2.4. Management and Clinical Course

The patient developed a transient hypotensive episode in the ED's resuscitation room with an MAP of 60 mmHg while under observation. Due to the patient's history of Jellyfish stings and anaphylactic reactions, the medical team began with the process of intravenous normal saline infusion. Kounis syndrome, a kind of allergic angina precipitated by the sting of jellyfish, was considered as the hypothesis. Patient received one dose of Solu-Medrol (methylprednisolone) 90 mg and remained on intravenous fluids. The rest of the lab investigations included serum tryptase, troponin and lactate as a follow up test to the suspected anaphylactic reaction.

Two hours after the initial assessment, the patient's troponin levels had increased to 428 ng/L, and his lactate had decreased to 2.75 mmol/L, indicating partial improvement. Hemodynamically, the patient stabilized, with a blood pressure of 103/63 mmHg, a heart rate of 69 beats per minute, and oxygen saturation of 99% on room air.

**Table 2.** Summary of follow-up laboratory results.

Test	Time of Measurement	Result	Reference Range
Troponin I	2 hours post-arrival	428 ng/L	<14 ng/L
Lactate	2 hours post-arrival	2.75 mmol/L	0.5 - 2.2 mmol/L
Sodium	2 hours post-arrival	144 mmol/L	135 - 145 mmol/L
Potassium	2 hours post-arrival	4.77 mmol/L	3.5 - 5.1 mmol/L

The cardiology team was consulted and advised that a troponin test should be repeated three hours after the first result is obtained. The next troponin level was also higher at 968 ng/L. This was especially likely because the patient subsequently had a significant increase in the troponin level with no apparent unequivocal

changes on ECG, features that formed part of the Kounis syndrome (**Table 2**). He was given Aspirin (250 mg) and then was taken to the Cardiology ICU as a follow-up and further intervention.

## 2.5. Cardiology ICU Evaluation

In the cardiology ICU, a transthoracic echocardiogram was performed, revealing the following findings:

**Left ventricular ejection fraction (LVEF):** 60%, with no segmental wall motion abnormalities.

**Left ventricular hypertrophy (LVH):** Septal wall thickness of 14.6 mm.

**Normal right ventricular function:** Tricuspid annular plane systolic excursion (TAPSE) of 19 mm.

**Normal aortic dimensions:** Ascending aorta measured 30 mm.

**No significant mitral or aortic valve disease.**

**Inferior vena cava (IVC):** Thin and collapsible, with >50% modulation.

A coronary angiogram was also conducted to evaluate the possibility of CAD or Coronary Artery Disease. According to the angiography results, the patient had no angiographically relevant stenosis meaning the patient did not have coronary artery disease. Having examined and discussed the case of our patient, the diagnosis of Kounis syndrome (Type I) was made with coronary vasospasm being more probable than others as causing the elevations in the patient's troponin level and clinical manifestations.

## 2.6. Final Diagnosis and Outcome

The patient's troponin levels started to decrease the day after the coronary angiogram and serum tryptase level was relatively high at 75 ng/ml. Pharmacological treatment was not complemented, as no coronary disease was underlying. No additional pharmacological treatment was introduced. The patient was discharged with advice to contact an allergist to determine his predisposition to anaphylactic reactions and tips on how to avoid them.

## 3. Discussion

Kounis syndrome: an allergic coronary artery disorder provoked by the release of inflammatory mediators during anaphylaxis and resulting in coronary spasm, myocardial damage or myocardial infarction [1]. It is categorized into three types: Type I is referred to as having no pre-existing coronary artery diseases, Type II involves plaque rupture or erosion in patients with coronary artery diseases, while Type III involves stent thrombosis in patients who have had stent implantation.

In this case, the patient was diagnosed with type I Kounis syndrome which is caused by an allergic reaction to jellyfish sting leading to histamine, serotonin and tryptase; the isolated mediators that cause spasm of coronary arteries and myocardial damage [1].

In 2021, Abdelghany *et al.* [3], conducted a systematic review and saw Kounis

syndrome as an individual entity that may present as acute coronary syndrome and results from allergic processes [3]. Further, it was pointed out that even though Infrequent, jellyfish stings have been cited to have been linked to Kounis syndrome as seen in this case on review. There have been many case reports where the same presented with complaints of jellyfish sting and developed both local as well as systemic reaction involving myocardium [4].

In this particular case, the absence of CAD on angiography, the high serum tryptase and the rising troponin levels after the allergic reaction confirmed the diagnosis of Kounis syndrome. New research on Type I Kounis syndrome has also pointed to the fact that this variant is difficult to distinguish from other causes of myocardial damage, primarily myocarditis, or stress cardiomyopathy [1].

In the management of Kounis syndrome, both the allergic reaction and the cardiac injury are treated. Another recent study by Brown and [5] explained that corticosteroids and antihistamines are effective in the treatment of the allergic part of Kounis syndrome and aspirin and nitrates in CA closure due to coronary artery spasm. Nevertheless, recent debate about the applicability of epinephrine use in anaphylaxis in Kounis syndrome has surfaced judiciously for fear of worsening the extent of coronary spasm.

In this case the patient was given corticosteroids and aspirin to bring his condition to normal. In this particular case, the increase in troponin level was moderate, and based on the coronary angiography the patient had no life threatening myocardial infarction.

There is a case of Kounis syndrome associated with bee sting which was discussed by Zhao *et al.* in their 2022 study; cardiac biomarkers were elevated and not CAD was significant [6]. As was seen in the present case, the patient in that study had a good response to corticosteroids and anti platelet therapy which underlined the need to intervene early in allergic reactions with cardiac involvement.

In the similar manner Wang *et al.*, in a case report in 2023 described a patient who had Kounis syndrome after contact with a marine allergen, like the present case, the patient had elevated troponin levels but who did not have angiographically significant coronary artery disease [7]. The two reports highlight how clinicians keep Kounis syndrome in mind especially when dealing with patients presenting features of allergic reactions with increased levels of cardiac biomarkers.

#### 4. Conclusion

Kounis syndrome is a rare but possibly lethal form of an allergic reaction that causes coronary artery spasm and myocardial injury. For the present case, a 53-year-old male patient developed Kounis syndrome after a jellyfish envenomation with symptoms of hypotension, increased troponin levels, and without evidence of significant CAD. Because the patient received prompt diagnosis and management strategies such as corticosteroids and antiplatelet agents, the produced outcome was positive. This case report also raises awareness of Kounis syndrome in patients with allergic reactions and cardiac complications, especially after expo-

sure to marine agents such as jellyfish envenoming. More study is required to clarify the underlying molecular mechanisms, as well as the of care strategy for Kounis syndrome, particularly among patients with propensity for recurrent allergic reactions.

### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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