

Acute coronary syndrome because of a scorpion sting in a patient with chronic coronary syndrome: A case report and review of the literature

Kronik koroner sendromlu bir hastada akrep sokması sonucu gelişen akut koroner sendrom: Bir olgu sunumu ve literatür derlemesi

Nuri Köse, M.D.¹ , Tarık Yıldırım, M.D.² 

¹Department of Cardiology, Yücelen Hospital, Muğla, Turkey

²Department of Cardiology, Balıkesir University School of Medicine, Balıkesir, Turkey

Summary– The occurrence of acute coronary syndrome (ACS) following a scorpion sting has been very rarely reported in literature, and most of the cases presented had a normal coronary angiogram. The possible pathogenetic mechanisms include imbalance in blood pressure and coronary spasm caused by a combination of sympathetic excitation with subsequent thrombosis of coronary vessels developed after the release of vasoactive, inflammatory, and thrombogenic substances contained in the scorpion venom. In this report, we present a case of a scorpion sting complicated by ACS, called Kounis syndrome (KS). His coronary angiogram revealed the presence of significant stenosis of the left anterior descending artery. He was treated successfully with percutaneous transluminal coronary angioplasty, antivenom serum, and supportive therapy.

Özet– Akrep sokmasını takiben gelişen akut koroner sendrom (AKS) literatürde çok nadiren bildirilmiş olup, olguların çoğunda anjiyografide koroner arterler normal olarak saptanmıştır. Altta yatan muhtemel patojenik mekanizmalar; akrep zehirinde bulunan vazoaaktif, enflamatuar ve trombojenik maddelerin salınımını takiben gelişen, koroner damarda tromboz ile sempatik aktivitenin kombinasyonundan kaynaklanan kan basıncındaki değişkenliği ve vazospazmı içerir. Bu yazıda, akrep tarafından sokulduktan sonra AKS gelişen Kounis sendromu (KS) olgusu sunulmuştur. Bu hastada, koroner anjiyografi sol ön inen arterde ciddi darlık gösterdi ve olgu destekleyici tedavi, antivenom serumu, perkütan transluminal koroner anjiyoplasti ile başarılı bir şekilde tedavi edildi.

Scorpion stings are commonly encountered in many countries around the world, including Turkey. Scorpion envenomation is a serious public health problem, mainly for rural populations in tropical and subtropical regions.^[1] Though local symptoms including severe pain and burning sensation at the site of sting are the most common manifestations, systemic complications can ensue.^[2] The neurotoxins from scorpion venom are potent activators of the autonomic nervous system resulting in a physiopathological disorder of vital systems.^[3] Most serious clinical manifestations are neurotoxic effects, pulmonary edema, and cardiovascular distress, including myocardial infarction, cardiogenic shock, myocarditis, and even death.^[4,5]

Kounis syndrome (KS), which is a result of mast cell activation induced by inflammatory mediators released owing to allergic reaction, is characterized

by acute coronary syndrome (ACS). Drugs, food, insect bites, bee or scorpion

stings, environmental factors such as pollen and drug-coated stent implantation can be the triggering factors of allergic reaction.^[6,7] In this case, a 54-year-old man, who had chronic coronary syndrome, presented with type II KS which was complicated by non-ST segment elevation ACS because of the scorpion sting.

Abbreviations:

ACS	Acute coronary syndrome
KS	Kounis syndrome

CASE REPORT

A 54-year-old man presented to our hospital's emergency department with a complaint of chest pain that lasted half an hour, which started three hours after a scorpion bite on his right arm when work-



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Correspondence: Nuri Köse, M.D. Department of Cardiology, Yücelen Hospital, Muğla, Turkey.

Tel: +90 533 385 53 12 e-mail: drnurikose@hotmail.com

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Figure 1. Erythematous areas on the right forearm of the patient after a scorpion sting.

ing in his garden. The incriminated species was *Mesobuthus gibbosus*, 7 cm in size, detected in health structure by the patient. In his medical history, he had grade II exercise angina according to the Canadian Cardiovascular Society Classification for three months but without a previous history of allergy, drug use, rhinitis, bronchial asthma, dermatitis, eczema, or diabetes. A physical examination on admission revealed a temperature of 36.7°C, oxygen saturation 96%, respiration of 17/min, blood pressure of 120/80 mmHg, and a pulse of 72 beats/min. On the dorsal side of the forearm, there was a mild swelling, rubor, and tenderness in two separate areas, which were approximately 1.0×1.5 cm in size owing to the scorpion sting (Figure 1). A 12-lead electrocardiogram showed sinus rhythm and biphasic T wave inversion in V1-4 derivations (Figure 2). A transthoracic echocardiographic examination showed apical wall hypokinesia and normal left ventricular systolic functions with an ejection fraction of 55%.

The laboratory values revealed a troponin-T of 4.8 ng/mL (0.0-0.02), total cholesterol of 264 mg/dL, low-density lipoprotein cholesterol of 177 mg/dL, high-density lipoprotein cholesterol of 41 mg/dL,

and a triglyceride level of 230 mg/dL. The neutrophil, lymphocyte, and monocyte ratios were normal, and the eosinophil rate was slightly increased at 5.06% (0%-5%) in complete blood count. Immunoglobulin E level was 112 g/L (0-100).

A unifying diagnosis of KS secondary to scorpion envenomation was made. In the emergency department, he was treated with scorpion antivenom (Acsera® 5 mL) and pheniramine hydrogen maleate 45.5 mg intravenously. He was treated with acetylsalicylic acid (300 mg), clopidogrel (loading dose of 300 mg), intravenous nitroglycerin, and heparin (5000 IU) before the intervention for ACS. He was admitted to the catheterization laboratory five hours after the scorpion sting. The coronary angiogram showed a normal right coronary artery, a normal left circumflex artery, and 90% stenosis in the distal left anterior descending artery (Figure 3A). The lesion was crossed with guidewire, and a drug-eluting 3.0×26 mm stent was deployed with an excellent angiographic result (Figure 3B). Angiotensin converting enzyme inhibitor, beta blocker, and statin were added to therapy after angiography. He was discharged two days later and has been symptom-free for two years at follow-up.

Table 1. Cardiovascular effects of scorpion venom

Vascular phase	Increased left ventricular afterload, impaired left ventricular emptying Increased left ventricular filling pressure, increased myocardial contractility
Myocardial phase	Myocardial stunning, low cardiac output, and hypotension

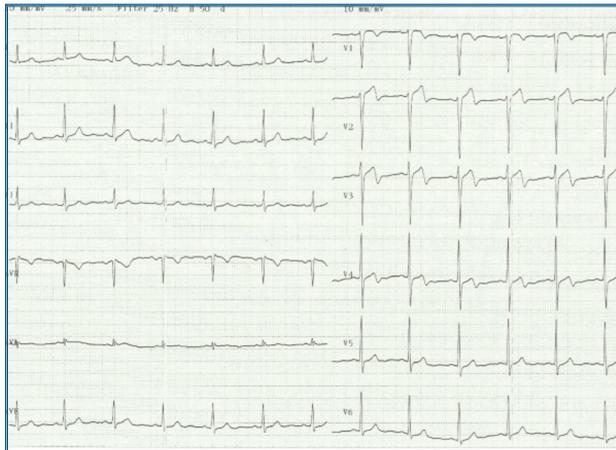


Figure 2. ECG during admission showing biphasic T wave inversion in the lead V1-4.
ECG: electrocardiography.

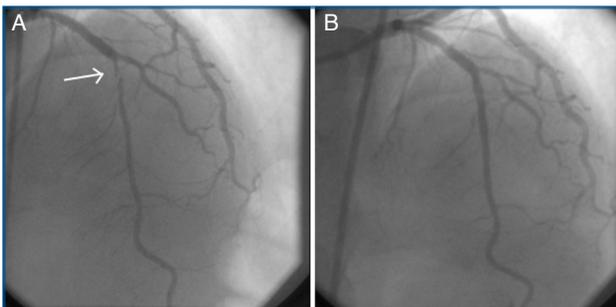


Figure 3. (A) Anterior-posterior cranial view of a left coronary angiogram showing 90% stenosis in the distal LAD (arrow); (B) LAD completely open after stent implantation.
LAD: left anterior descending artery.

DISCUSSION

Scorpion stings is an important public health problem, especially for the people who live in the countryside in many countries.^[8] Scorpion venom is a cocktail of several low molecular weight basic proteins, neurotoxins, nucleotides, aminoacids, oligopeptides, cardiotoxins, nephrotoxin, hemolytic toxins, phosphodiesterase, phospholipase, hyaluronidase, acetylcholinesterase, glycosaminoglycans, histamine, serotonin, 5-hydroxyptamine, and proteins that inhibit protease, angiotensinase and succinate-dehydrogenase, ribonuclease, and 5- nucleotidase. Multiple tox-

ins may be present in the venom of a single species of scorpion capable to produce a potent synergic effect in the victim. Neurotoxins of scorpion venom is more lethal than the neurotoxins in snake venom.^[9]

Scorpion venom may lead to some severe complications. Release of vasoactive, inflammatory, and thrombogenic mediators act on coronary arteries and induce coronary artery vasospasm and facilitate thrombus formation.^[7] The venom causes myocarditis by reducing sodium-potassium-adenosine triphosphatase and releasing adrenaline and noradrenaline from the neurons, which may lead to adrenergic myocarditis.^[10] The release of allergic mediators leads to hypotension by vasodilation and causes a decrease in intravascular volume because of increased vascular permeability, which is the underlying mechanism of anaphylaxis. This venom inhibits angiotensin converting enzyme, resulting in bradykinin accumulation and pulmonary edema.^[11,12] Various cardiovascular effects of scorpion venom are shown in Table 1.

There are two phases of cardiovascular response after the scorpion sting. The first phase is characterized by profound catecholamine-related vasoconstriction leading to increased left ventricular afterload, impaired left ventricular emptying, increased left ventricular filling pressure, and capillary wedge pressure, resulting in pulmonary edema.^[13] Myocardial contractility increases to maintain cardiac output. Myocardial phase, which is characterized by a decreased contractility, low cardiac output, and hypotension, occurs after the vascular phase.^[14]

KS known as allergic myocardial infarction have been defined by three types. There is ischemia caused by coronary vasospasm caused by allergic mediators such as histamine, thromboxane, and leukotrienes in patients with normal coronary arteries without atherosclerotic risk factors and coronary artery disease in type I KS.^[7,15] Type II KS is seen in patients with atherosclerotic coronary artery disease because of the activation of the coagulation system as a result of coronary vasospasm, plaque erosion or rupture, with

Table 2. Clinical characteristics of patients with scorpion envenomation in the literature

	Age (years)	Admission period (hour)	ECG	Blood pressure (mmHg)	Initial treatment	Coronary angiography	Mortality
Patra et al. ^[17]	65	0.5	Anterior ST segment elevation	170/84	Prazocine	LAD 70% stenosis, RCA 80% stenosis	No
Baykan et al. ^[5]	55	2	Inferior ST segment elevation	142/75	Antivenom	CX 100% stenosis	No
Maneshwari and Tanvar ^[18]	35	0.5	Inferolateral ST segment elevation	154/84	Antiplatelet, Beta blocker	Normal	No
Agrawal et al. ^[19]	14	3-4	Inferolateral ST segment elevation	70/30	Dopamine, Dobutamine, Steroid	No	Yes
Lobo and Nacul ^[20]	19	5	Sinus tachycardia	116/95	Furosemide, Morphine sulfate	No	Yes
D'sa et al. ^[21]	32	24	Sinus tachycardia	Shock	Vasopressor, Inotropic, IABP	No	No
Bayar et al. ^[13]	49	6	Sinus tachycardia	240/110	Acetylsalicylic acid, Heparin, Nitrate, Antivenom	No critical CAD	No
Köse and Yıldırım (present case)	54	3.5	Anterior T wave inversion	120/80	Antivenom, Pheniramine hydrogen maleate, Acetylsalicylic acid, Clopidogrel, Nitroglycerin, Heparin	LAD 90% stenosis	No

CAD: coronary artery disease; CX: circumflex artery; ECG: electrocardiography; IABP: intra-aortic balloon pump; LAD: left anterior descending artery; RCA: right coronary artery.

the effect of proteolytic enzymes such as histamine, chymase, and tryptase released from activated mast cells. Type III KS is seen in patients with drug-eluting stent thrombosis.^[15]

Most of the reported patients with ACS due to scorpion sting had normal coronary arteries on coronary angiography, the so-called KS.^[16] Although myocardial infarction cases owing to scorpion sting are rarely reported in the literature, the general characteristics and initial treatments of these cases are shown in Table 2.^[5,13,17-21] Significant coronary artery stenosis was detected rarely, as in our patient.^[17] Apart from coronary vasospasm and platelet aggregation with thrombosis, the most possible pathophysiologic mechanism for ACS in our patient could be the ath-

erosclerotic plaque rupture because of scorpion venom. Although intravascular ultrasound is an appropriate diagnostic tool to access plaque composition and define the atherosclerotic lesion phenotype, we could not perform it.^[22]

The aim of the treatment in a patient with KS owing to scorpion sting is to treat both the allergic reaction and the acute coronary syndrome. Patients presenting with scorpion sting should be evaluated in terms of cardiac and other systemic complications. The degree of allergic reaction should be determined, respiratory support should be provided and if necessary, scorpion antiserum should be administered according to the symptoms. Systemic arterial hypertension increased myocardial contractility, and

tachyarrhythmia because of increased catecholamine discharge in the first phase, called the vascular phase owing to scorpion sting, may develop in some patients.^[7] Isolated beta blocker use without alpha blockage should be avoided during this period as it will aggravate autonomous storm. In this phase, hypertension must be treated with alpha blocker agents such as doxazosin and prazosin because of excessive adrenergic discharge.^[13,17] Positive inotropic agents such as dopamine and dobutamine can be used with caution in patients who develop heart failure, hypotension, and acute pulmonary edema owing to scorpion sting. Narcotic analgesics such as morphine are not recommended because they have a synergistic effect with scorpion venom, increase the frequency of arrhythmia, inhibit noradrenaline reuptake, and potentiate respiratory depression.^[13,23] In the treatment of ACS, first, the patient should be stabilized with medical treatment, and coronary angiography and percutaneous coronary intervention should be performed when indicated.^[15,24]

In conclusion, not only should the patients who presented to the hospital because of scorpion sting be assessed and followed closely in terms of the possible cardiovascular complications; but also, in case of ACS, coronary angiography should be performed to rule out significant coronary artery stenosis.

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Anahtar Kelimeler: Akrep zehiri; akut koroner sendrom; perkütan transluminal koroner anjiyoplasti