

Kounis Syndrome: Acute Coronary Syndrome Induced by a *Loxosceles Laeta* Bite in a 9-Year-Old Boy



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INTRODUCTION

Kounis syndrome is an acute coronary syndrome (ACS) caused by an anaphylactoid reaction secondary to noxa. It is caused by the overproduction and degradation of mast cells that play a role in the pathophysiology of significant coronary vasospasm that can produce myocardial ischemia and symptoms indistinguishable from a type 1 myocardial infarction (due to rupture or erosion of the atherosclerotic plaque).¹

We present the case of a pediatric patient who presented with ACS after a *loxosceles* bite that remitted after the administration of anti-*loxosceles* serum.

CASE PRESENTATION

A 9-year-old male patient with a history of allergic rhinitis and allergy to peanuts was admitted to the emergency department of a rural clinic due to retrosternal acute chest pain of intensity 7/10 associated with diaphoresis and palpitations that began 2 hours after being bitten by a *loxosceles laeta* spider. On admission, the vital signs were heart rate of 110 beats bpm, SatO₂ of 95%, and blood pressure of 100/60 mm Hg. The clinical history suggested acute myocarditis, which was the reason to request a study of cardiac biomarkers and an electrocardiogram; the local health unit did not have an echocardiogram available, so it was not possible to carry out this study. A complete blood count and a panel of immunoglobulins were also ordered. Out of these studies, cardiac biomarkers were within the normal ranges, with a troponin I level of 0.02 ng/mL (normal <0.04) and creatine kinase of 150 U/L (normal <200). In contrast, the electrocardiogram revealed marked ST-segment elevation in the anterior, anteroapical, and

VIDEO HIGHLIGHTS

Video 1: Two-dimensional TTE, parasternal long axis (1-month follow-up). The diameters of the cavities and the LV wall motion are normal.

Video 2: Two-dimensional TTE, parasternal short-axis view at mitral valve level. The LV wall motion is normal.

Video 3: Two-dimensional TTE, apical 4-chamber view. Normal LV wall motion in the anterolateral and inferoseptal walls.

Video 4: Two-dimensional TTE, apical 3-chamber view. Normal LV wall motion in the anteroapical and inferolateral walls.

Video 5: Two-dimensional TTE, apical 2-chamber view. Normal LV wall motion in the anterior and inferior walls.

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lateral leads, with reciprocal depression in the inferior leads II, III, and aVF (Figure 1).

The other diagnostic studies revealed a mild leukocytosis ($12 \times 10^3/L$) with an eosinophil count of $0.6 \times 10^3/L$ (normal <0.5) and an immunoglobulin E level of 350 UI/mL (normal <200 UI/mL). The rest of the laboratory analyses were within the normal parameters.

After being hospitalized, management with steroids and anti-*loxosceles* serum was started, leading to a sudden decrease in chest pain and normalization of the electrocardiogram (Figure 2). One month later, the patient was transferred to a hospital where a follow-up two-dimensional transthoracic echocardiogram (TTE) was performed to evaluate left ventricular (LV) global and regional systolic function, which showed normal diameters of the cavities, no evidence of wall motion abnormalities, and normal values of the systolic and diastolic biventricular function. No evidence of congenital heart disease was found (Figure 3, Videos 1-5).

DISCUSSION

The case described is a male pediatric patient with no history of heart disease who was admitted due to ACS in the context of an anaphylactoid reaction to a *loxosceles* bite.

Kounis syndrome (allergic infarction) is not an unusual condition, but its diagnosis can become challenging to the physician due to lack of awareness of this pathology.

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Keywords: Anaphylaxis, *Loxosceles Laeta* spider, Perimyocarditis

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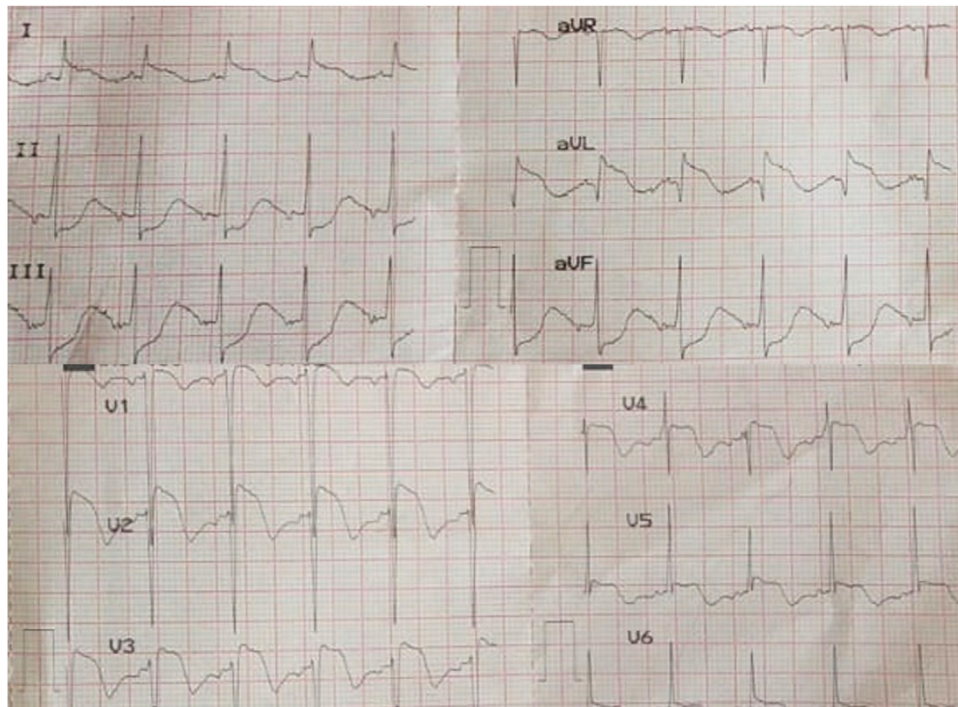


Figure 1 Photograph of the electrocardiogram in sinus rhythm, heart rate of 107 bpm. ST-segment elevation in the anterior, antero-septal, and lateral leads, with reciprocal depression in the inferior leads II, III, and aVF. As the hospital medical records are kept on paper, no high-quality digital copy was available for this publication.

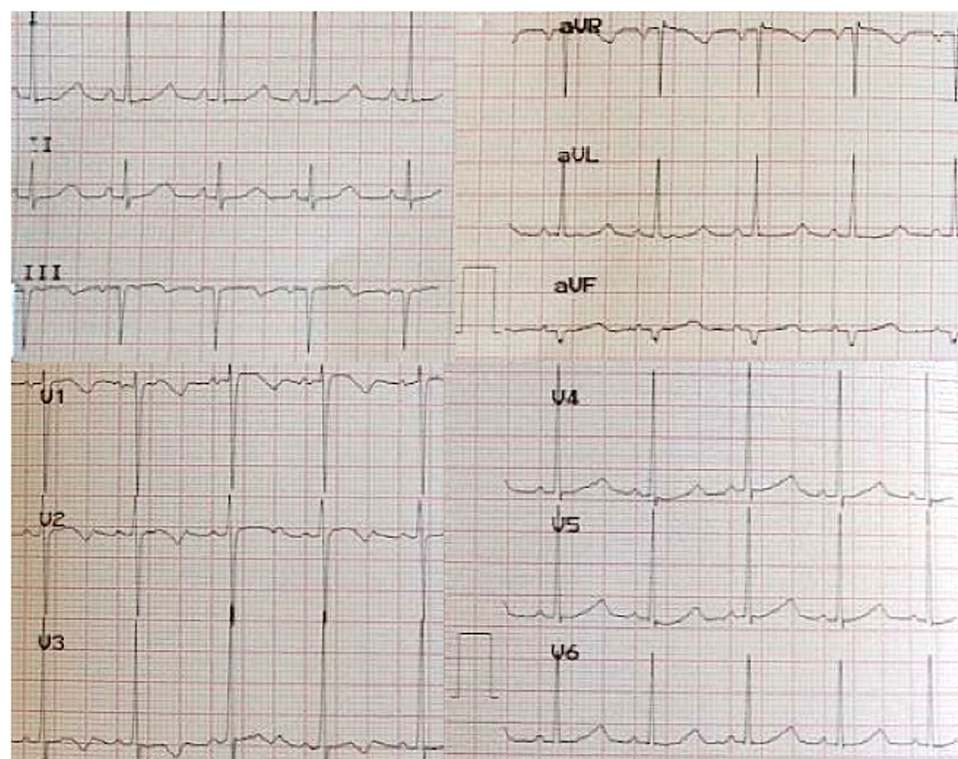


Figure 2 Photograph of the electrocardiogram in sinus rhythm, heart rate of 100 bpm. As the hospital medical records are kept on paper, no high-quality digital copy was available for this publication.

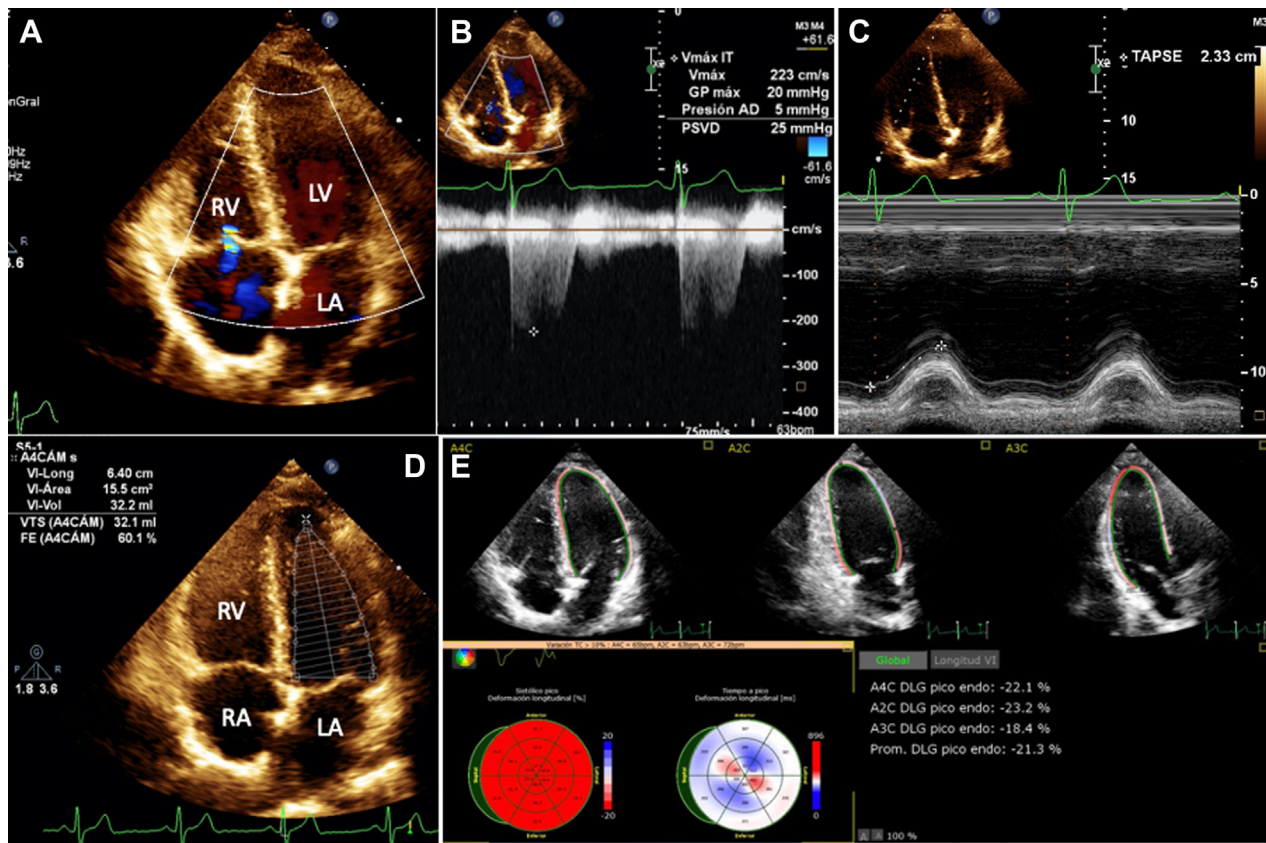


Figure 3 Two-dimensional TTE. Apical 4-chamber view, systolic phase, with color Doppler demonstrating mild tricuspid regurgitation (A) and continuous-wave Doppler revealing normal right ventricular systolic pressure via a peak tricuspid regurgitant velocity of 223 cm/sec (B). M mode demonstrates a normal *tricuspid annular plane systolic excursion* at 2.3 cm (C). The estimated LV ejection fraction (D) and global longitudinal strain (E) were also normal at 60% and -21.3%, respectively. LA, Left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle.

This syndrome has been associated with coronary artery vasospasm and is caused by mast cell degranulation and the release of proinflammatory mediators. In previous literature, it is often classified into 3 groups: type I, which corresponds to allergic vasospastic angina in patients without prior known coronary artery disease²; type II, which is caused by an allergic myocardial infarction in patients with prior known coronary artery disease; and type III, which is associated with patients with stent thrombosis in whom a significant accumulation of mast cells and eosinophils is evident in the histopathological tissue sample.^{1,3} Thus, we infer that this case represents type I Kounis syndrome, the most common among the 3 types and the one with a better prognosis.⁴

The case presented is interesting because when loxoscelism affects the myocardium, it generally manifests as myocarditis or a perimyocarditis with symptoms of chest pain and, in some cases, with positive cardiac biomarkers analysis.⁵

The electrocardiogram showed a significant elevation of the extensive anterior ST segment with a reciprocal image in the inferior wall, suggesting an anterior descending artery obstruction.

Despite these electrocardiographic characteristics, the clinical history of loxoscelism, the patient's age and the remission of the ST-segment elevation in less than 20 minutes led to a diagnosis of a vasospastic cause in the context of the anaphylactic reaction.

According to the ST-segment elevation ACS guidelines, primary percutaneous coronary intervention should be performed in patients with STEMI and ischemic symptoms in less than 12 hours.⁶ However, due to a rapid resolution of the patient's symptoms and the unavailable coronary angiography setting at the rural facility, the management did not include an invasive procedure. Upon reflection, had the health setting been different, we believe clinical management would have been the same and a coronary computed

tomography angiography would have been performed to exclude Kawasaki disease.

Anti-ischemic therapy for this condition is also controversial because it can aggravate the allergic reaction, as can steroid anti-inflammatory therapy. Furthermore, this therapy has been associated with worse outcomes in patients with myocardial infarction. Therefore, the management must be tailored to the individual.

After the complementary therapy, the patient was discharged with no symptoms. The parents were advised of a follow-up at an outpatient pediatric cardiology clinic, at which the patient has shown evidence of normalized systolic function and no symptomatic recurrence.

CONCLUSION

Kounis syndrome is a cause of coronary syndrome in pediatric patients that should be suspected whenever there is a history of a noxa. Although the most frequent cause of infarction in children is Kawasaki disease, it is crucial to be aware of the multiple causes that can lead to coronary artery syndromes in pediatric patients.

ETHICS STATEMENT

The authors declare that the work described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans.

CONSENT STATEMENT

The authors declare that since this was a non-interventional, retrospective, observational study utilizing de-identified data, informed consent was not required from the patient under an IRB exemption status.

FUNDING STATEMENT

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DISCLOSURE STATEMENT

The authors report no conflict of interest.

SUPPLEMENTARY DATA

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.case.2022.09.001>.

REFERENCES

1. Kounis NG. Kounis syndrome: an update on epidemiology, pathogenesis, diagnosis, and therapeutic management. *Clin Chem Lab Med* 2016;54: 1545-59.
2. Kounis NG, Konari I, Soufras GD, Tsigkas G, Chourdakis E, Despotopoulos S, et al. Kounis syndrome: an additional etiologic factor of myocardial infarction with non-obstructive coronary arteries. *Cardiol J* 2018;25:648-9.
3. Akyel A, Namik Murat S, Çay S, Kurtul A, Hakan Öcek A, Cankurt T. Late drug eluting stent thrombosis due to acemetacine: type III Kounis syndrome: Kounis syndrome due to acemetacine. *Int J Cardiol* 2012;155: 461-2.
4. Abdelghany M, Subedi R, Shah S, Kozman H. Kounis syndrome: a review article on epidemiology, diagnostic findings, management, and complications of allergic acute coronary syndrome. *Int J Cardiol* 2017;232:1-4.
5. Langner TR, Ganatra HA, Schwerdtfäger J, Stoecker W, Thornton S. Viscerocutaneous loxoscelism manifesting with myocarditis: a case report. *Am J Case Rep* 2021;22.
6. O'Gara PT, Kushner FG, Ascheim DD, Casey DE Jr, Chung MK, de Lemos JA, et al. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: executive summary. *Circ* 2013;127: 529-55.