

# Acute Myocarditis or the Kounis Syndrome: Role of Cardiac MRI and Speckle-Tracking Echocardiography in Diagnosis

Oguz Karaca<sup>1,\*</sup>; Beytullah Cakal<sup>1</sup>; Sinem Deniz Cakal<sup>1</sup>; Muhsin Turkmen<sup>1</sup>

<sup>1</sup>Department of Cardiology, Faculty of Medicine, University of Medipol, Istanbul, Turkey

\*Corresponding author: Oguz Karaca, Department of Cardiology, Faculty of Medicine, University of Medipol, Istanbul, Turkey. Tel: +90-5053557600, Fax: +90-2124607070, E-mail: oguzkaraca@hotmail.com

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**Introduction:** The Kounis syndrome and acute myocarditis are two distinct clinical entities, which could share nearly the same symptomatology as well as ECG (electrocardiography) and laboratory findings.

**Case Presentation:** First case was a 39-year-old male presented with acute chest pain and inferolateral ST elevation on ECG. The second case was a 29-year-old male presented with chest pain and diffuses ST elevation. Diagnosis of acute myocarditis was achieved by demonstrating subepicardial contrast enhancement as well as atypical involvement in both of our clinical cases.

**Conclusions:** We reported two cases in which specific imaging modalities (cardiac magnetic resonance imaging and speckle-tracking echocardiography) were used when the signs and symptoms were indistinguishable.

**Keywords:** Kounis Syndrome; Myocarditis; Magnetic Resonance Imaging, Speckle-Tracking Echocardiography

## 1. Introduction

The Kounis syndrome and acute myocarditis are two distinct clinical entities, which could share nearly the same symptomatology as well as ECG (electrocardiography) and laboratory findings. After exclusion of significant coronary artery disease by coronary angiography, diagnostic dilemmas have usually been encountered in clinical practice. While history of atopy and allergenic substance exposure supports the Kounis syndrome known as "allergic myocardial infarction", preceding symptoms compatible with a viral infection are considered to be related to acute myocarditis. We reported two cases in which specific imaging modalities were used when the signs and symptoms were indistinguishable.

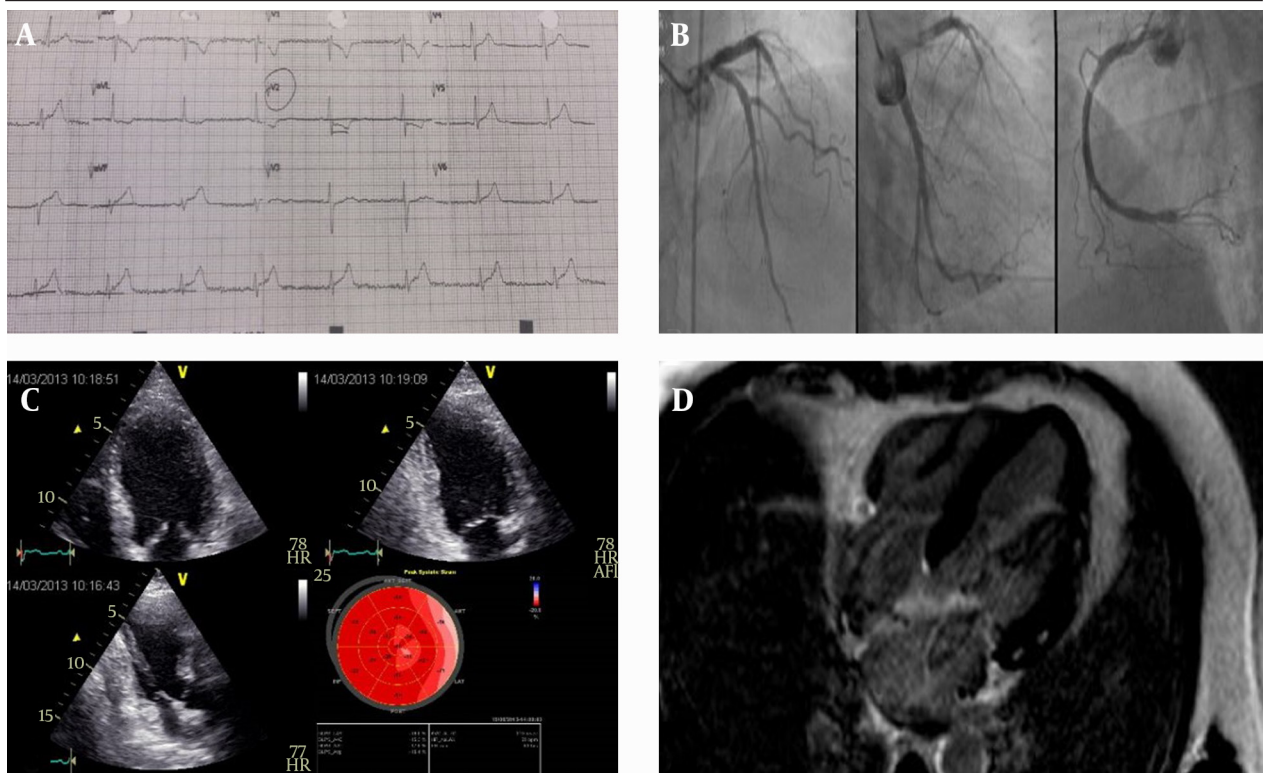
## 2. Case Presentation

First case was a 39-year-old male presented with acute chest pain and inferolateral ST elevation on ECG (Figure 1 A). He was receiving amoxicillin because of pharyngitis. Angiography revealed non-critical plaques (Figure 1 B). TTE showed posterolateral hypokinesia with an EF of 45%. Acute myocarditis and the Kounis syndrome (allergic myocardial infarction due to amoxicillin) were considered as differential diagnoses. LV (left ventricular) strain analysis showed reduced global (GLS: global longitudinal strain) and regional values incompatible with any coronary artery area (Figure 1 C). MRI showed antero-

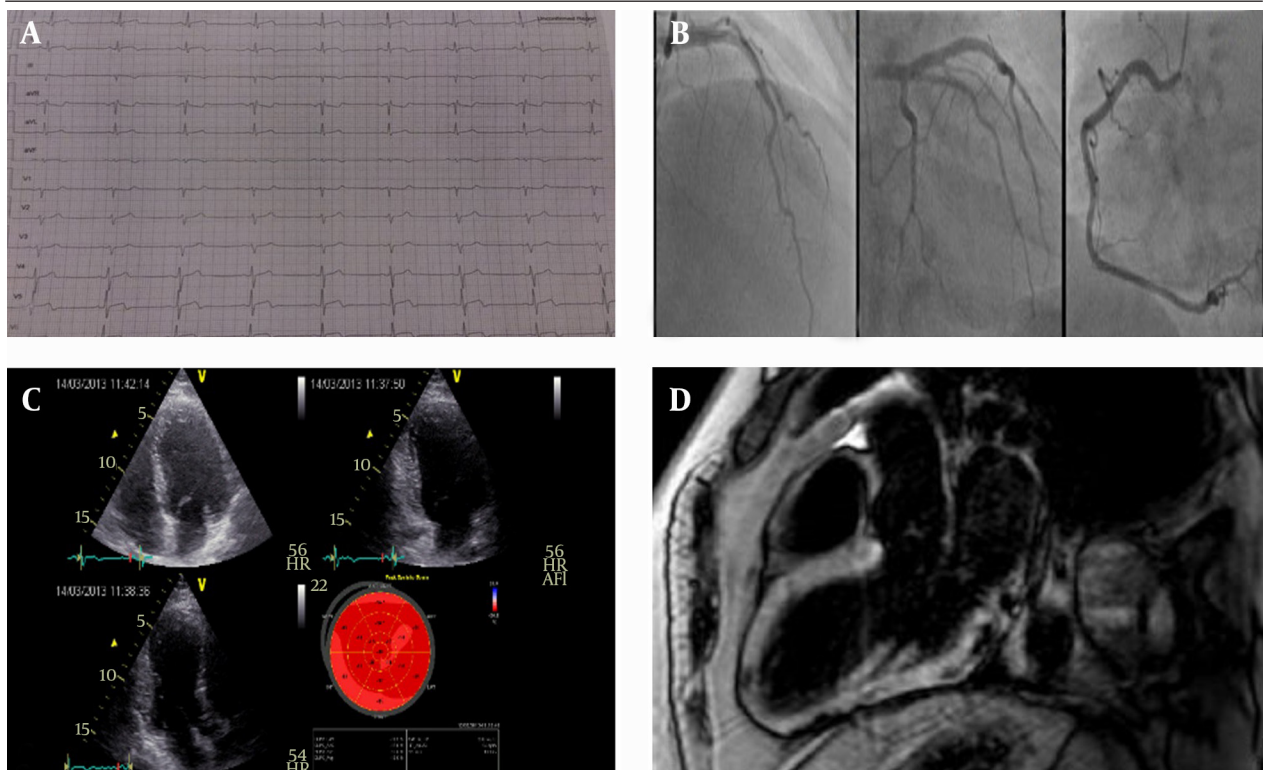
lateral and posterolateral hypokinesia and edema with late gadolinium enhancement (LGE) at subepicardial regions (Figure 1 D). The second case was a 29-year-old male presented with chest pain and diffuses ST elevation (Figure 2 A) on ECG and elevated serum troponin level. He was receiving cefuroxime because of tonsillitis on admission. Angiography revealed normal coronary arteries (Figure 2 B). On transthoracic echocardiography, EF was 40% with hypokinesia of the anterior and lateral walls. 2D-speckle tracking echocardiography showed reduced left ventricular global strain (LV-GLS) values and reduced strain values at the apical, anterior and inferoseptal walls (Figure 2 C). MRI showed anterolateral and inferior hypokinesia and edema with LGE at the subepicardial regions (Figure 2 D). Diagnosis of acute myocarditis was achieved by demonstrating subepicardial contrast enhancement as well as atypical involvement in both of our clinical cases.

## 3. Conclusions

Myocarditis and allergic myocardial infarction known as the Kounis syndrome should be always kept in mind in patients with acute chest pain, ECG changes and increased cardiac enzymes in case of normal coronary arteries (1). In the Kounis syndrome, subendocardial layer of the myocardium is affected compatible with the territory



**Figure 1.** A, ECG of the patient showing marked ST segment elevations; B, coronary angiographic snapshots showing that the patient does not have significant coronary disease; C, 'bull's eye' report of the longitudinal strain analysis showing heterogeneous impairment by speckle tracking echocardiography; D, magnetic resonance imaging demonstrating subepicardial contrast enhancement.



**Figure 2.** A, Diffuse ST elevations on the ECG; B, coronary angiography revealed normal coronary arteries; C, impairment in longitudinal strain is not compatible with a specific coronary artery territory; D, subepicardial LGE in cardiac MRI suggestive of acute myocarditis.

of a particular coronary artery, while heterogeneous and subepicardial involvement is detected in acute myocarditis (1, 2). Combination of cardiac MRI and speckle-tracking echocardiography successfully differentiates these two clinical entities when ECG and laboratory findings are indistinguishable.

### Authors' Contributions

Oguz Karaca: Analysis and interpretation of data and drafting of the manuscript; Beytullah Cakal and Sinem

Deniz Cakal: acquisition of data. Muhsin Turkmen: administrative, technical and material support.

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