

CASE REPORT

Acute myocarditis with normal wall motion detected with 2D speckle tracking echocardiography

Thomas Sturmberger, Johannes Niel, Josef Aichinger and Christian Ebner

Department of Cardiology, Angiology and Critical Care Medicine, Elisabethinen Hospital Linz, Linz, Austria

Correspondence should be addressed to T Sturmberger

Email
thomas.sturmberger@elisabethinen.or.at

Summary

We present the case of a 26-year-old male with acute tonsillitis who was referred for coronary angiography because of chest pain, elevated cardiac biomarkers, and biphasic T waves. The patient had no cardiovascular risk factors. Echocardiography showed no wall motion abnormalities and no pericardial effusion. 2D speckle tracking revealed distinct decreased regional peak longitudinal systolic strain in the lateral and posterior walls. Ischemic disease was extremely unlikely in view of his young age, negative family history regarding coronary artery disease, and lack of regional wall motion abnormalities on the conventional 2D echocardiogram. Coronary angiography was deferred as myocarditis was suspected. To confirm the diagnosis, cardiac magnetic resonance tomography (MRT) was performed, showing subepicardial delayed hyperenhancement in the lateral and posterior walls correlating closely with the strain pattern obtained by 2D speckle tracking echocardiography. With a working diagnosis of acute myocarditis associated with acute tonsillitis, we prescribed antibiotics and nonsteroidal anti-inflammatory drugs. The patient's clinical signs resolved along with normalization of serum creatine kinase (CK) levels, and the patient was discharged on the third day after admission.

Learning points:

- Acute myocarditis can mimic acute coronary syndromes.
- Conventional 2D echocardiography lacks specific features for detection of subtle regional wall motion abnormalities.
- 2D speckle tracking expands the scope of echocardiography in identifying myocardial dysfunction derived from edema in acute myocarditis.

Background

Patients presenting with chest pain and elevated cardiac biomarkers are frequently seen in clinical practice, and a comprehensive investigation has to be done to reveal the right diagnosis. If myocarditis is suspected, endomyocardial biopsy is recommended in patients with impaired left ventricular ejection fraction or complex arrhythmias (1). The diagnosis of myocarditis with

normal left ventricular ejection fraction is challenging and often empirically made on the basis of clinical presentation, ECG changes, elevated cardiac enzymes, and lack of coronary artery disease. Focal myocarditis can mimic acute coronary syndromes, and therefore, invasive coronary angiography is frequently performed in this clinical setting.

The current reference standard for noninvasive diagnosis of myocarditis is cardiac magnetic resonance imaging, which is costly and not widely available (2).

In this report, we present a case of acute myocarditis with normal left ventricular wall motion diagnosed by 2D speckle tracking imaging.

Case presentation

A 26-year-old male with no cardiovascular risk factors was initially admitted to a local hospital with acute tonsillitis. On admission, blood pressure was 133/74 mmHg, heart rate 73/min, body temperature 38.4°C and respiratory rate 21 breaths/min with an oxygen saturation of 98% while breathing ambient air. The initial ECG revealed sinus rhythm and biphasic T waves in leads V1–V4, II, III, and aVF (Fig. 1). Laboratory tests showed elevated serum creatine kinase (CK) of 1913 U/L (normal 1–171 U/L), CK-myoglobin (CK-MB) isoenzyme fraction of 92 U/L (normal <25 U/L), and high-sensitivity troponin I >37,000 ng/L (normal <25 ng/L). Furthermore, inflammatory markers were slightly elevated with leukocytosis of $13.2 \times 10^9/L$ (normal 4–10), 63% neutrophils (normal 40–74%), and C-reactive protein of 14.1 mg/dL (normal <1.0).

Because myocardial ischemia was suspected the patient was referred to our hospital for coronary angiography.

Investigation

In our institution, a comprehensive transthoracic echocardiography was performed, showing normal regional wall motion with preserved left ventricle ejection fraction (Videos 1, 2 and 3). In contrast to conventional 2D echocardiography, which failed to visualize impairment of the lateral wall, automated function imaging, which was assessed by 2D speckle tracking imaging, revealed a distinct decreased peak in the systolic longitudinal strain of the lateral and posterior walls (Fig. 2; bull's eye). Elevated cardiac enzymes and decreased longitudinal systolic shortening usually favor the diagnosis of acute coronary syndrome, but in this young patient, myocardial ischemia was extremely unlikely.

Video 1

Transthoracic echocardiography was performed showing normal regional wall motion with preserved left ventricle ejection fraction. View Video 1 at <http://movie-usa.glencoesoftware.com/video/10.1530/ERP-16-0013/video-1>.

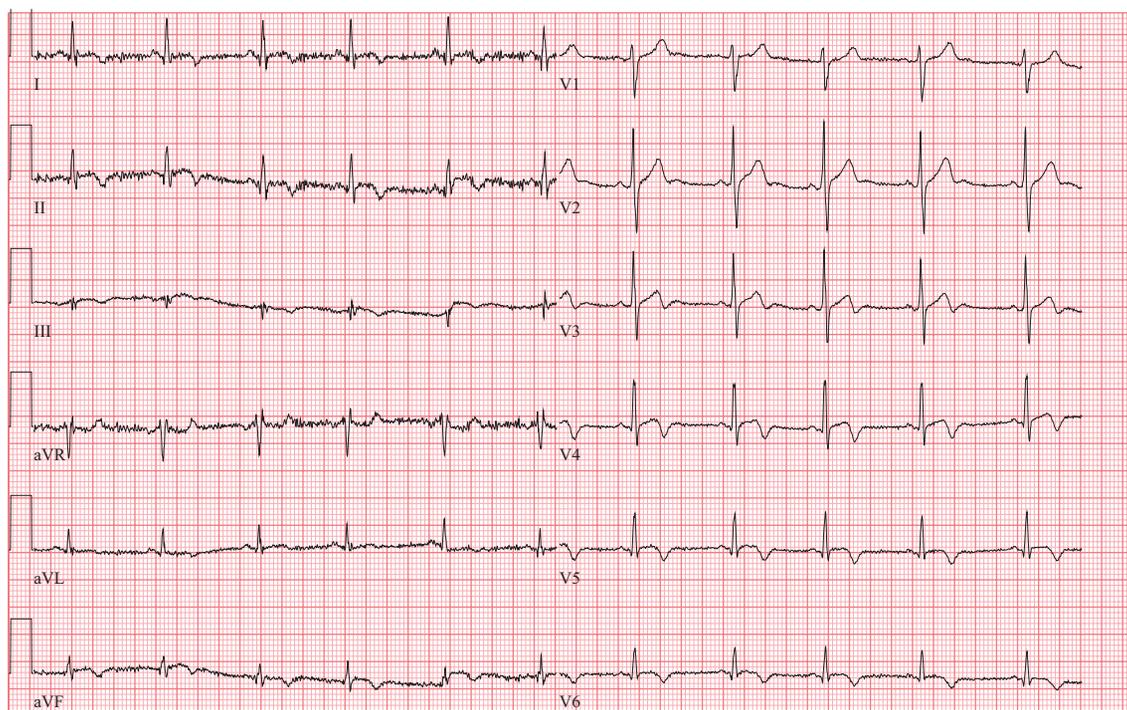


Figure 1
ECG at admission showing biphasic T-Waves in the leads V4-V6, II, III and aVF.

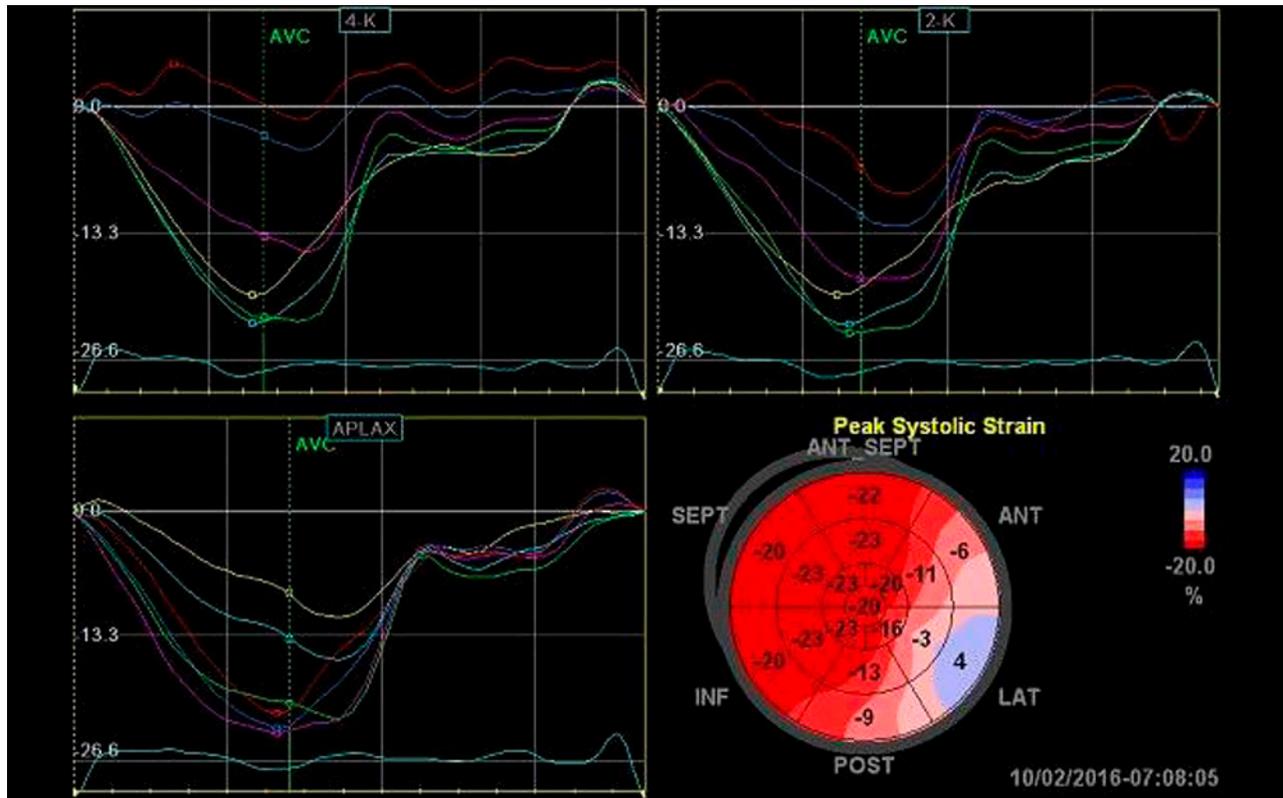


Figure 2

Bull's eye strain map (automated functional imaging) showing significantly reduced peak systolic strain in lateral, anterior and posterior segments.

Video 2

Transthoracic echocardiography was performed showing normal regional wall motion with preserved left ventricle ejection fraction. View [Video 2](http://movie-usa.glencoesoftware.com/video/10.1530/ERP-16-0013/video-2) at <http://movie-usa.glencoesoftware.com/video/10.1530/ERP-16-0013/video-2>.

Video 3

Transthoracic echocardiography was performed showing normal regional wall motion with preserved left ventricle ejection fraction. View [Video 3](http://movie-usa.glencoesoftware.com/video/10.1530/ERP-16-0013/video-3) at <http://movie-usa.glencoesoftware.com/video/10.1530/ERP-16-0013/video-3>.

Even though acute viral infections are accounting for most of the cases of infectious myocarditis, in this particular case accompanying nonrheumatic streptococcal myocarditis was suspected in view of acute tonsillitis. To confirm the diagnosis, cardiac magnetic resonance tomography was performed, which showed subepicardial delayed enhancement at the lateral and posterior walls in accordance with myocarditis (Fig. 3A and B). We elected to abstain from invasive investigations (i.e., coronary angiography or endomyocardial biopsy) due to substantial evidence for acute myocarditis.

Treatment and outcome

For the treatment of acute tonsillitis, antibiotic therapy with amoxicillin 1g b.i.d. for 10 days was prescribed. Furthermore, the patient was given dexibuprofen to relieve chest pain. The patient's clinical signs resolved within 2 days along with the normalization of serum CK levels and T waves. The patient was discharged free of symptoms on the third day after admission. The patient was advised to avoid competitive sport for 6 months.

Discussion

In patients with chest pain, elevated myocardial enzymes, and the absence of ST elevation, non-ST-elevating myocardial infarction is often the leading diagnosis. Further investigations frequently include invasive strategies such as coronary angiography, which is associated with occasional procedural risk. Noninvasive tools to distinguish acute myocardial ischemia from

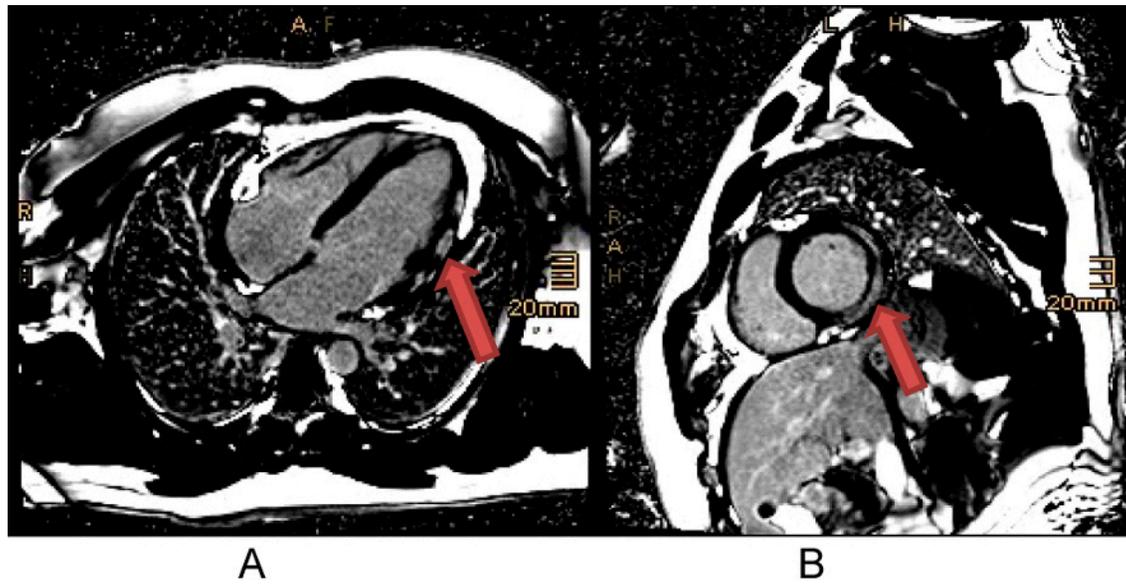


Figure 3

(A and B) cardiac magnetic tomography showing subepicardial late enhancement at the lateral and posterior wall in the 4 chamber view (A) and short axis (B).

other diseases mimicking acute coronary syndromes are clinically useful. Conventional echocardiography has a limited role in the diagnostic armamentarium for acute myocarditis due to its limited accuracy in the detection of subtle myocardial abnormalities. In patients with cardiac magnetic resonance (CMR)-proven acute myocarditis, conventional echocardiography often reveals no obvious changes in global cardiac function. Myocardial deformation imaging, assessed by 2D speckle tracking, is a promising method to characterize quantitatively myocardial systolic function (3).

Løgstrup and coworkers reported that 2D speckle tracking echocardiography was a useful tool in the diagnostic process of acute myocarditis, adding important information that can support clinical and conventional echocardiographic evaluation, especially in patients with preserved left ventricular ejection fraction (LVEF) (4). Therefore, strain analysis should be integrated into routine use of echocardiography to improve diagnostic investigations in suspected subclinical myocardial damage.

This case report demonstrates that decreased myocardial strain and reduced global longitudinal strain obtained by 2D speckle tracking echocardiography offers better sensitivity than conventional echocardiography for detection of regional wall motion abnormalities allowing the diagnosis of acute myocarditis in a patient with chest pain, elevated cardiac enzymes and normal LVEF, mimicking an acute coronary syndrome.

Declaration of interest

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of this case report.

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Patient consent

Written informed consent was obtained from the patient for publication of the submitted article and accompanying images.

Author contribution statement

T Sturmberger performed echocardiography, wrote the manuscript, and completed a literature review. J Niel collected the CMR images. C Ebner and J Aichinger reviewed the manuscript before submission and assisted with the review of the literature.

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