Incremental value of cardiac magnetic resonance imaging in the differential diagnosis of acute coronary syndrome in a young man

Mirja Neizel*, Malte Kelm, and Harald P. Kuehl

Medical Clinic I, University Hospital of the RWTH Aachen, Pauwelsstrasse 30, 52074 Aachen, Germany

*Corresponding author. Tel: +49 241 8036478, Fax: +49 241 80 82303, Email: mneizel@ukaachen.de

A 21-year-old male was admitted with recurrent chest pain, dyspnoea, and elevated levels of cardiac enzymes (troponin T 0.22 μg/L). The patient had a history of periodic amphetamine abuse. One week before the admission, he had an episode of fever (39.8°C), chills, and diarrhoea. ECG showed normal sinus rhythm without ST-T segment abnormalities. Invasive coronary angiography demonstrated no evidence of atherosclerotic disease. However, an abnormal origin of the right coronary artery (RCA) was detected.

The differential diagnosis included subendocardial ischaemia owing to amphetamine-induced coronary spasm or to an interarterial course of the RCA and acute myocarditis.

Cardiac magnetic resonance (CMR) was performed to track the anatomical origin and course of the anomalous RCA and to help with differential diagnosis.

Images of a free-breathing whole-heart acquisition allowed the exact anatomical depiction of the RCA originating from the left sinus valsalva and passing between the ascending aorta and the pulmonary trunk (Panel A). T2-weighted images of the myocardium showed myocardial oedema of the lateral wall (arrowheads in Panel B). Corresponding delayed enhancement images demonstrated subepicardial hyperenhancement (arrowheads in Panels C and D).

The diagnosis of acute myocarditis was established on the basis of CMR criteria. Amphetamine-induced coronary spasm is a well-known cause for myocardial ischaemia and infarction. An abnormal course of the RCA between aorta and pulmonary trunk may rarely be the cause of myocardial ischaemia potentially needing bypass surgery. CMR ruled out oedema in the RCA territory and ischaemia-typical late enhancement pattern in all coronary territories, making these two other differential diagnosis highly unlikely.

This case demonstrates the usefulness of CMR in the differential diagnosis in acute coronary syndrome with clear coronary arteries.

Panel A. Multiplanar reformatted image of a T1-weighted, free-breathing whole-heart acquisition showing the exact course of the abnormal right coronary artery (RCA) with origin from the left coronary sinus passing between the aorta and the pulmonary artery (PA).

Panel B. Short-axis view of a T2-weighted image of the same patient showing signs of myocardial oedema in the posterolateral myocardium (arrows).

Panels C and D. Short-axis and four-chamber view of delayed-enhancement images, demonstrating hyperenhancement of the lateral wall, mid to epicardial, as typical sign for myocarditis (arrows).