

Cardiac Sarcoidosis in a Patient With Hypertrophic Cardiomyopathy Demonstrated by Magnetic Resonance Imaging and Single Photon Emission Computed Tomography Dual-Isotope Scintigraphy

Jan-Peter Smedema, MD; Marinus J.P.G. van Kroonenburgh, MD, PhD; Gabriel Snoep, MD; Walter Backes, PhD; Anton P. Gorgels, MD, PhD

A 41-year-old man, who had been diagnosed with stage 2 pulmonary sarcoidosis 3 years earlier, was referred to the cardiac clinic complaining of palpitations, dyspnea, and atypical chest pain. Except for central obesity (body mass index of 37 kg/m²) and hypertension, no abnormalities were found on physical examination. The 12-lead ECG demonstrated apical and inferolateral ST-segment elevation, whereas multiple polymorphic premature ventricular beats were found during exercise testing and 24-hour ambulatory ECG.

Coronary angiography showed no abnormalities. Because of the man's obesity, the image quality of the transthoracic echocardiography was suboptimal. Cardiac MRI revealed severe asymmetric hypertrophy of the left ventricle, a finding that points to hypertrophic cardiomyopathy. T₂-weighted cardiac MRI revealed increased signal in the apical region (Figure 1), and contrast-enhanced cardiac MRI (0.1 mmol/kg gadolinium-diethylenetriamine pentaacetic acid [Gd-DTPA]) showed late enhancement of the same region (Figures 2 through 5).

A dual-isotope ^{99m}Tc-Hexamibi (Cardiolite, DuPont) and ¹¹¹In-pentetreotide (OctreoScan, Tyco Healthcare, Mallinckrodt Medical BV; dose 190 MBq) SPECT was performed during exercise (dose 280 MBq) and rest (dose 870 MBq),

revealing a reversible apical perfusion defect and apical uptake of ¹¹¹Inpentetreotide (Figure 6). The presence of somatostatin receptors in the apical region suggests active apical cardiac sarcoidosis.

The SPECT and cardiac MRI images were fused (Figures 7 and 8) by rigid-body transformations based on anatomic landmarks (apex and basal interventricular septum) and the geometric dimensions identified in the different types of images. The spatial image transformations were computed in the MatLab (MathWorks) programming environment. ¹¹¹In-pentetreotide binds to somatostatin receptors on macrophages and has been reported to be useful in the management of sarcoidosis. It is possible to differentiate between active inflammation and fibrosis with different cardiac MRI techniques (eg, T₂-weighted versus contrast-enhanced T₁-weighted cardiac MRI).

This case demonstrates the usefulness of matching different imaging techniques to visualize inflammation and the different stages of this process in the myocardium.

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From the Departments of Cardiology (J.-P.S., A.P.G.), Nuclear Medicine (M.v.K.), and Radiology (G.S., W.B.), the Maastricht Cardiovascular Sarcoidosis Study Group (MACAS), University Hospital Maastricht, Maastricht, the Netherlands.

Correspondence to Dr J.-P. Smedema, University Hospital Maastricht, Dr P Debyelaan 25, PO Box 5800, 6202 AZ Maastricht, The Netherlands. E-mail jansmedema@hotmail.com

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Figure 1. T₂-weighted cardiac MRI short-axis view of the apex reveals increased signal in this region.



Figure 3. Contrast-enhanced cardiac MRI demonstrates late enhancement of apical region in the short-axis view.

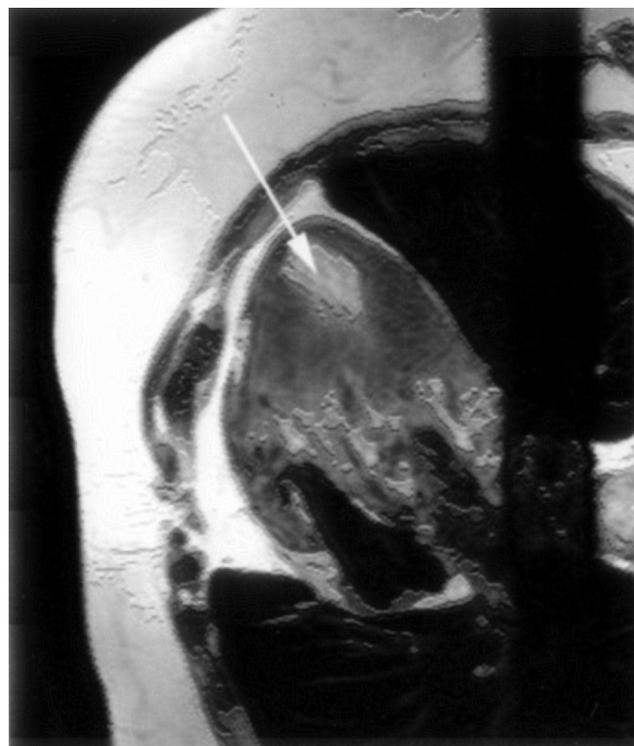


Figure 2. Contrast-enhanced cardiac MRI demonstrates late enhancement of the same region in the 4-chamber view.



Figure 4. Contrast-enhanced cardiac MRI after inversion recovery prepulse demonstrates late enhancement of the apical region in the 4-chamber view.

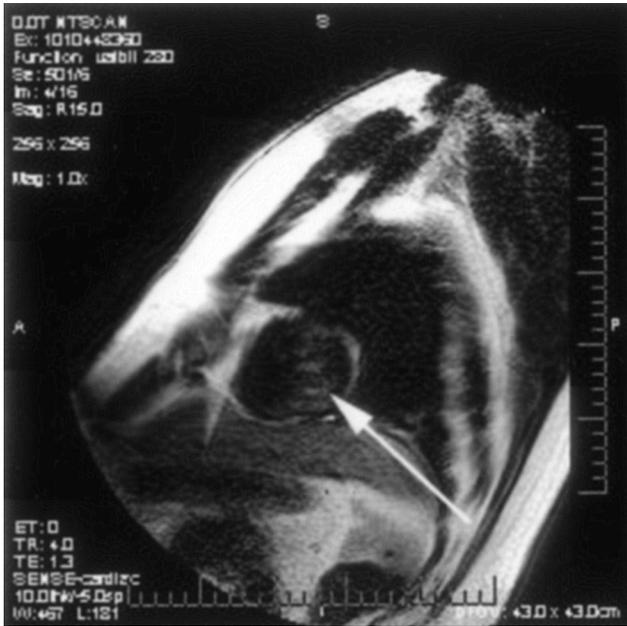


Figure 5. Contrast-enhanced cardiac MRI after inversion recovery prepulse demonstrates late enhancement of the apical region in the short-axis view.



Figure 7. Fusion of the contrast-enhanced cardiac MRI and ^{99m}Tc -Hexamibi SPECT images demonstrates matching of the perfusion defect and Gd-DTPA enhancement of the apical region.

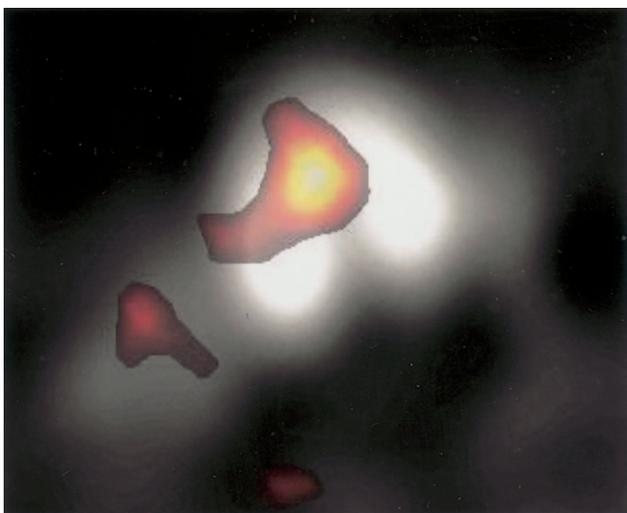


Figure 6. Fusion of the resting ^{99m}Tc -Hexamibi and ^{111}In -pentetreotide SPECT images demonstrates matching of the apical ^{99m}Tc -Hexamibi perfusion defect and ^{111}In -pentetreotide uptake.

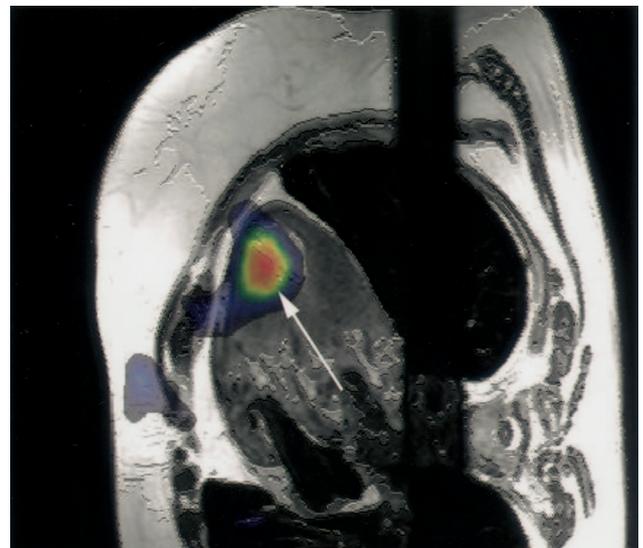


Figure 8. Fusion of the contrast-enhanced cardiac MRI and ^{111}In -pentetreotide SPECT images demonstrates matched uptake of ^{111}In -pentetreotide and Gd-DTPA in the apical region.