

Cardiac Magnetic Resonance and Dual-source CT Detect Lipomatous Metaplasia of Left Ventricle in Chronic Myocardial Infarction

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Introduction: The histological evolution of myocardial infarction has been studied in some detail. At autopsy, however, 68% of scars associated with chronic ischemic heart disease have shown lipomatous metaplasia in the scar. So we use cardiac magnetic resonance (CMR) and dual-source CT to detect fatty tissue to confirm the morphologic change.

Methods: 11 patients (8 males, 3 females, 52-74years old, average 64 years old) with a history of previous myocardial infarction and dual-source CT demonstration of fatty change in left ventricle underwent CMR examinations.

Results: Of the 11 patients examined, 8 cases of lipomatous metaplasia were identified by CMR(72.7%); the infarctions happened 5 months-28years ago, 5 patients had PTCA+stent therapy, 2 patients had CABG and 1 patient by medicine alone. In 5 cases (62.5%), the thickness of the fatty tissue less than half of the scar.

ECG-gated 1.5T cine- CMR (steady-state free precession) showed wall thinner and akinesia or hypokinesia of the anterior or inferior wall. Before contrast injection, these segments exhibited a heterogeneous signal on cine-CMR, with a high signal component in the central surrounded by a low signal border (Panels a, b, and c). Non-contrast black-blood T1-weighted spin echo images revealed a high signal in the anterior wall (Panel d), along with dramatic signal decay after fat saturation (Panels e and f), indicating the presence of intramyocardial fat. Delayed-enhanced images(LCE) acquired 10 min after Gd -DTPA (0.1 mmol/kg) revealed late hyper enhancement in infarct territories. CT plan scan (Panels A, B) and ECG-gated coronary CT (Panels C, D) showed hypodensity (-80 HU) in the anterior wall, indicating fatty infiltration, the location and extent consistent with CMR findings. The CT value varies from -56 to -113 HU.

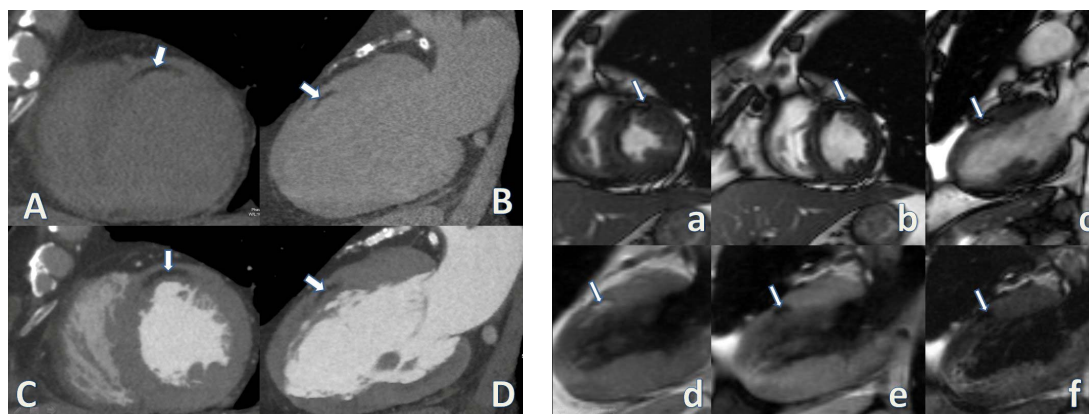


FIGURE 1. CT images demonstrate curvilinear fat in the anterior wall (arrow), CT plan scan (Panels A, B) and coronary CT (Panels C, D) Short axis (Panels A, C) and long axis (Panels B, D)

FIGURE 2. CMR images demonstrate curvilinear fat in the anterior wall (arrow), cine-CMR (Panels a, b, and c) and non-contrast black-blood T1-weighted spin echo image (Panel d), after fat saturation T1WI (Panel e), T2WI (Panel f) Short axis (Panels a, b) and long axis (Panels c, d, e, f)

Conclusion: 1 A high signal intensity on LCE images may not always represent fibrosis alone but lipomatous metaplasia in regions of old myocardial infarction. 2 The presence of fat supports the speculation that a regenerative cell, or multipotent stem cell, exists within the heart, and under the influence of microenvironmental or therapeutic factors can differentiate into fat, other mesenchymal tissues, and potentially even myocardium. 3 As technology improves, lipomatous metaplasia may be observed in old myocardial infarctions and may be depicted by CMR and dual-source CT. Although comprehensive CMR has a unique value for tissue characterization of the myocardium and fat imaging, dual-source CT is well suited for detection of fatty infiltration in infarcted myocardium, in addition to its value for non-invasive coronary angiography.

Key Words: Cardiac magnetic resonance , dual-source CT, lipomatous metaplasia, myocardium

References: 1. Baroldi G, Silver MD, De Maria R, Parodi O, Pellegrini A. Lipomatous metaplasia in left ventricular scar. *Can J Cardiol.* 1997;13:65-71.