

Assessment of Peri-infarct Ischemia Through Comprehensive Evaluation of Stress Perfusion and Myocardial Viability Predicts Adverse Events in Patients with Severe Ischemic Cardiomyopathy

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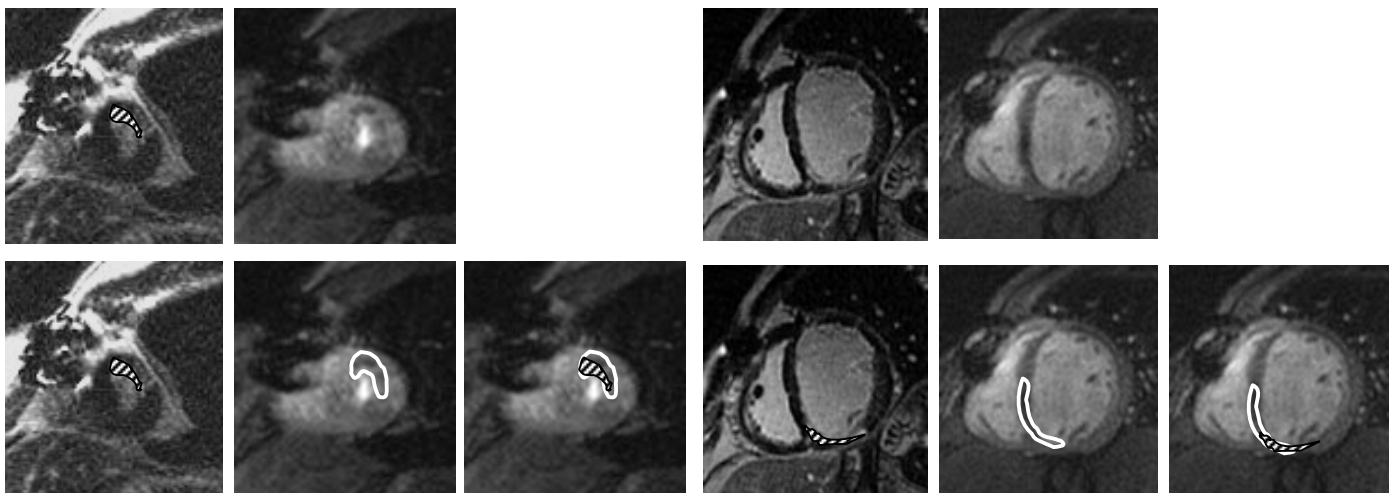
Background: There is a high mortality rate in ischemic cardiomyopathy (ICM) patients with severe left ventricular (LV) dysfunction. The presence of peri-infarct ischemia has been associated with a high incidence of cardiovascular events in this patient population.

Purpose: The purpose of this investigation is to assess whether MR assessment of peri-infarct ischemia provides prognostic information in patients with severe ICM to guide revascularization therapy.

Methods: Fifteen patients (13 men, 2 women, mean LVEF $23 \pm 8.5\%$) with ICM recently diagnosed with severe coronary artery disease (three vessel, left main, or two vessel with proximal left anterior descending artery) were recruited prospectively for MR delayed enhanced and stress perfusion studies prior to undergoing medical therapy +/- implantable cardiac defibrillator (ICD) placement. All images were acquired on a 1.5-Tesla whole-body scanner (Signa, GE, Milwaukee, WI) with the patient in a supine position using a 8-element phased-array radifrequency coil with breath-holding and cardiac gating. Myocardial stress perfusion (FGRE-ET: Fast Gradient Echo-EchoTrain, TR 6.6, TE 1.2, TI 180) was performed with 0.05 mmol/kg Gd-DTPA (Gd-DTPA, Magnevist, Schering AG, Germany) bolus during adenosine-induced stress (140 mcg/kg/min for 4 minutes) followed by delayed enhanced study (segmented *k*-space inversion recovery, TR 7.1, TE 3.1, TI 200-250, slice thickness 10mm, slice gap 0) of the entire LV starting at 20 min following total administration of 0.2 mmol/kg of Gd-DTPA. The study was completed with rest myocardial perfusion using 0.1 mmol/kg Gd-DTPA bolus. The patients were followed for post-discharge adverse cardiovascular events including ventricular arrhythmia, unstable angina, myocardial infarction, worsening congestive heart failure, hospitalization, or cardiac death.

Results: During a mean of 6 months follow-up, 75% of the patients with peri-infarct ischemia and 0% of the patients without peri-infarct ischemia had cardiovascular events ($p < 0.009$). The measurement of total scar volume and scar percent of LV volume (scar/LV volume) did not correlate with the development of cardiovascular events. The mean volume of scar was $16 \pm 15 \text{ cm}^3$ in patients who suffered cardiovascular events and $21 \pm 17 \text{ cm}^3$ in those without events ($p = 0.14$). The scar percentage of LV volume in patients with cardiovascular events was $9.2 \pm 8.1\%$ and in those without was $16 \pm 12\%$ ($p = 0.13$).

Conclusions: In patients with severe ICM, the presence of peri-infarct ischemia determined by cardiac MRI was associated with a higher incidence of cardiovascular events. Cardiac MRI may enable accurate prediction in this high-risk patient population to help guide the appropriate therapeutic decision such as a need for coronary revascularization.



(A) Peri-infarct ischemia in anterior region

(B) Peri-infarct ischemia in inferior region