

Prognostic Value of High-dose Dobutamine Stress MR: Long-term Follow-up of Patients not undergoing Revascularization

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Introduction: Cardiac Stress MRI using high-dose dobutamine (DSMR) has been established as a reliable technique for the assessment of myocardial ischemia in patients with coronary artery disease (CAD). Several studies comparing dobutamine stress MRI and dobutamine stress echocardiography demonstrated a higher sensitivity and specificity of magnetic resonance imaging for the detection of myocardial ischemia. Beyond the detection of ischemia and the prediction of functional recovery in patients with ischemic global or regional dysfunction after revascularization, little is known about the prognostic value of dobutamine stress MRI in patients suffering from coronary artery disease. Our study aimed to evaluate the value of high-dose dobutamine stress MRI for the assessment of cardiac prognosis in patients with suspected coronary artery disease.

Material and Methods: High-dose DSMR was successfully performed in 384 patients (288 male, 96 female; mean age, 64) with clinically suspected CAD using a 1.5T MR System (Magnetom Sonata; Siemens Medical Solutions; Erlangen, Germany). Segmented steady-state free precession sequence (TrueFISP, TR, 3ms; TE 1.5ms; FA 60°) were collected in long and short axis orientations at different stress levels. A dobutamine / atropine protocol (dobutamine: 10, 20, 30, and 40 µg/kg*min and up to 1 mg of atropine) was used until 85% of the age-predicted heart rate was achieved (220-age). The DSMR examinations were evaluated by an experienced radiologist and a cardiologist in consensus. Myocardial ischemia was defined by new or worsening wall motion abnormalities under stress in more than one myocardial segment. Clinical follow-up was performed for at least 12 months (mean 16 months), and the occurrence of major adverse cardiac events (cardiac death, myocardial infarction, unstable angina requiring hospitalization and coronary arterial revascularization) was determined.

Results: No severe adverse events related to the dobutamine stress MR examination occurred in the study group. In 153 patients, coronary catheter angiography was performed, and DSMR yielded a sensitivity of 86% and specificity of 88% for the detection of coronary artery stenosis >70% in at least one major coronary artery (Fig 1). 64 of these 153 patients were scheduled for immediate revascularization and, thus, excluded from the follow-up study. Therefore, a clinical long-term follow-up could be performed in 320 patients. In 49 of these 320 patients, wall motion abnormalities were detected at DSMR. Of these 49 patients, 12 (24.5%) had major adverse cardiac events during the follow-up time frame, whereas only 23 of 271 patients (8.5%) without wall motion abnormalities had major adverse cardiac events within the follow-up period.

Conclusions: High-dose dobutamine stress MRI is a robust and accurate diagnostic test for the assessment of myocardial ischemia. Beyond the detection and quantification of myocardial ischemia, DS-MRI can be used to forecast major adverse cardiac events in patients with known or suspected coronary artery disease.

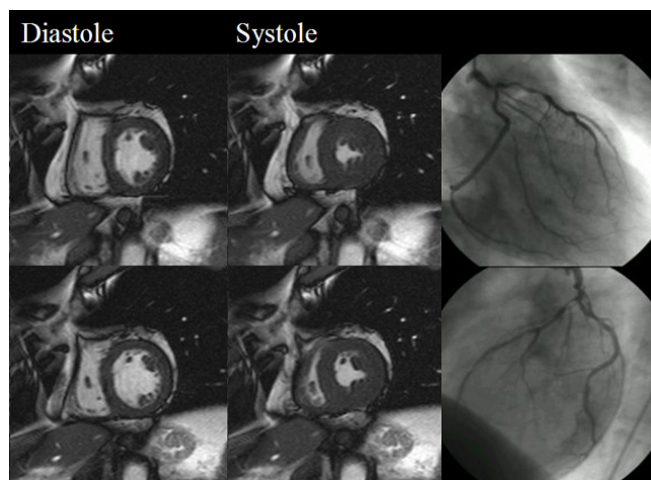


Figure 1: Short axis views at rest (upper row) and during dobutamine (lower row) show a stress induced anterior hypokinesia. Catheter angiography confirmed a stenosis of the LAD.

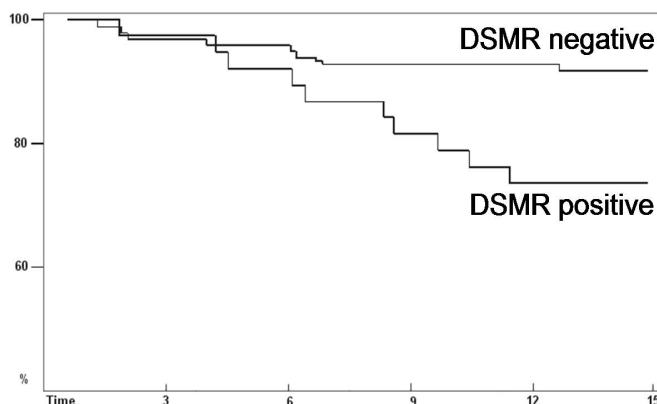


Figure 2: Event free survival calculated by Kaplan-Meyer curves for patients with (DSMR positive) and without (DSMR negative) stress induced wall motion abnormalities.