

# The myocardial performance index during dobutamine stress echocardiography

Prognostic implications after a first acute myocardial infarction

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## ABSTRACT

The present dissertation is based on investigations conducted at the Department of Medical Research, Sygehus Fyn, Svendborg.

The prognosis after acute myocardial infarction (AMI) depends on multiple and interrelated factors. Among them, left ventricular (LV) function at rest, myocardial viability, and inducible ischemia are of major prognostic significance. Pharmacologic stress echocardiography with titrated dobutamine infusion allows an integrated assessment of these three variables. Traditionally, the detection of myocardial viability and ischemia during dobutamine stress echocardiography is based on a visual interpretation endocardial excursion and motion. This approach is however, semi-quantitative, experience dependent, and provides only information of LV systolic function. In contrast, the echocardiographic Doppler myocardial performance index (MPI) is a quantitative, reproducible measure of combined LV systolic and diastolic function.

We hypothesized that evaluation of the MPI response during dobutamine stress echocardiography, as a measure of combined LV systolic and diastolic reserve would provide prognostic information beyond traditional systolic wall motion analysis on mortality, cardiovascular morbidity, and LV dilation after AMI.

We prospectively studied 162 consecutive patients with a first AMI. Low-dose dobutamine echocardiography (LDDE, 10 µg/kg/ min) was performed within 24 hours of admission. High-dose dobutamine echocardiography ( $\leq 40$  µg/kg/min $\pm$ atropine) was assessed five days after admission. MPI and wall motion analyses were performed at baseline and at the low-dose and high-dose stages. Twenty-five healthy volunteers served as controls. To assess serial changes in LV volumes, echocardiography was repeated 1, 3, and 6 months post AMI. End-points were all-cause mortality and cardiac events (cardiac death or readmission due to heart failure or reinfarction).

We found that evaluation of the MPI response during LDDE compares favorably to wall motion analysis for risk stratification after AMI and is likely to be an important step in the effort to objectively assess overall LV functional reserve. Within 24 hours of an AMI, an increase in MPI during LDDE, as an indicator of poor overall LV reserve, predicts progressive LV dilation and provides prognostic information incremental to clinical data, indices of systolic, diastolic, and global LV function at rest, and conventional stress echocardiographic data. Analyses of MPI and wall motion during high-dose dobutamine infusion five days after admission did not provide any additional prognostic information. This could potentially alleviate the need for diagnostic high-dose dobutamine infusions, and thereby improve the safety profile of stress echocardiography early after AMI.