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The additive prognostic value of end-systolic pressure-volume relation by CMR in patients with with known or suspected coronary artery disease

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Background: The variation between rest and peak stress end-systolic pressure-volume relation is an afterload-independent index of left ventricular contractility. This index is easily obtained during routine stress echocardiography but can be derived also during a stress cardiovascular magnetic resonance (CMR) exam, that is the gold standard for the quantification of biventricular volumes.

Purpose: The aim of this study was to assess for the first time the prognostic value ofdelta rest-stress ESPVR (DESPVR) by dipyridamole stress-CMR in patients with known or suspected coronary artery disease (CAD).

Methods: One hundred and sixty-six consecutive patients (37 females, main age 61.96 ± 10.05 years) who underwent dipyridamole stress-CMR in a high volume CMR Laboratory were considered. Abnormal wall motion and perfusion at rest and after dipyridamole were analysed. Macroscopic myocardial fibrosis was detected by the late gadolinium enhancement (LGE) technique. The ESPVR was evaluated at rest and peak stress from raw measurement of systolic arterial pressure by cuff sphygmomanometer and end-systolic volume by biplane Simpson method.

Results: An abnormal stress CMR was found in 39 (23.5%) patients; 24 patients had a reversible stress perfusion defect in at least one myocardial segment and 15 a reversible stress perfusion defect plus worsening of stress wall motion in comparison with rest. Myocardial fibrosis was detected in 69 patients (41.6%). A DESPVR < 0.009 was detected in 74 patients (44.6%).

During a median follow up of 55.51 months (IQ range 33.20 months), 54 patients (32.5%) experienced major cardiac events: 5 deaths, 2 ventricular arrhythmias, 18 coronary syndromes, and 29 heart failure hospitalization.Reversible perfusion deficit, DESPVR < 0.009, diabetes and family history were significant univariate prognosticators. In the multivariate analysisthe independent predictive factors were reversible perfusion deficit (hazard ratio-HR = 2.17, P = 0.010), DESPVR < 0.009 (HR = 1.92, P = 0.028) and diabetes (HR = 2.42, P = 0.004). The Kaplan–Meier curve for DESPVR is shown in Figure 1. The log-rank test revealed a significant difference (P = 0.003).

Conclusions: DESPRV assessed by CMR provides a prognostic stratification in patients with known or suspected coronary artery disease, in addition to that supplied by reversible perfusion deficit and diabetes.

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