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Outcome prediction with force-based left ventricular contractile reserve during stress echocardiography

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Background: Stress echo (SE) risk stratification is based on regional wall motion abnormalities (RWMA). The assessment of global left ventricular contractile reserve (LVCR) based on load-independent Force may refine prognosis.

Aim: To assess the value of LVCR during SE in predicting outcome

Methods: From September 2016 to December 2018, we prospectively enrolled 1848 patients (age 63 ± 11 years; 1121 males, 60%) with known or suspected coronary artery disease and/or heart failure evaluated with SE (exercise in 543, dipyridamole in 1184, adenosine in 10, dobutamine in 43) in 9 quality-controlled centers of 6 countries. Force was measured at rest and peak stress as the ratio of systolic blood pressure by cuff sphygmomanometer/end-systolic volume by 2D and biplane Simpson method of disks. When Simpson method was not feasible, apical single plane or linear parasternal methods were used to calculate volumes. Abnormal values of LVCR (peak/ rest) based on force were ≤ 1.10 for dipyridamole and adenosine; ≤ 1.61 for exercise or dobutamine. All patients were followed-up for a median of 16 months.

Results RWMA and Force-based LVCR were obtained in all pts. Force was 4.24 ± 1.88 mmHg/ml at rest and increased during stress (7.07 ± 4.60 mmHg/ml, $p < .001$). At individual patient analysis, LVCR was abnormal in 495 (26%) and normal in 1373 (74%) patients. At follow-up, there were 218 events: 22 deaths, 22 non-fatal myocardial infarctions, 62 hospital admissions for acute heart failures, and 112 late (> 3 months from SE) myocardial revascularizations. At multivariable analysis, stress-induced RWMA (Hazard Ratio, HR, 2.899, 95% Confidence Intervals, CI: 2.032-4.137, $p < .001$), force-based LVCR (HR 1.747, 95% CI: 1.245-2.470, $p = .002$) were independent predictors. Kaplan-Meier curves showed worse event-free survival for pts with abnormal LVCR: see figure.

Conclusion LVCR based on Force is a useful adjunct to RWMA for risk stratification with SE.

Abstract P329 Figure. Survival curves and LVCR

