# Myocardial deformation imaging in early prediction of heart failure development after STEMI is better than conventional echocardiography: true or false?

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**onbehalf:** PREDICT-VT

Heart failure (HF) still develops in 4% up to 28% of STEMI pts treated by pPCI, with the highest incidence in the first year. Accurate and early identification of high-risk patients would allow targeted and personalized intensive treatment .

**Aim:** the current study is a sub-study of PREDICT-VT study (NCT03263949). Its aim is to define multi-parametric model for early HF prediction in STEMI patients treated by pPCI, based on clinical data, conventional echocardiographic data and data from myocardial deformation analysis obtained by early speckle tracking echocardiography.

**Methods:** in 307 consecutive pts enrolled in PREDICT-VT, early echocardiography ($5 \pm 2$ days after pPCI) was done and included LA and multilayer LV deformation analysis with longitudinal (L), radial (R) and circumferential (C) strain (S; %) and strain rate (SR, 1/sec). LV indices of post systolic shortening for longitudinal (PSS LS) and circumferential (PSS CS) strains were also calculated .

**Results:** From 242 patients who completed 1-year follow-up, 9 % develop HF NYHA class 3 or 4, 27 % NYHA class 2 and remaining 64% were in NYHA class I. Significant univariate NYHA predictors were: from clinical parameters - female gender (ß =0.156, p = 0.015; 95% CI -0.431 to – 0.047), older age (ß =0.130, p = 0.044; 95% CI 0.000 to 0.017), Killip class on admission (ß=0.131, p = 0.043; 95% CI 0.007 to 0.435) and previous atrial fibrillation (ß=0.181, p = 0.005; 95% CI 0.175 to 0.960); from conventional echo parameters- LVEF (ß=-0.302, p < 0.001; 95% CI -0.029 to -0.012), LAVI (ß=0.134, p = 0.046; 95%CI 0.000 to 0.030), degree of diastolic dysfunction (ß=0.297, p < 0.001; 95% CI 0.192 to 0.465) and TAPSE (ß=-4.255, p < 0.001); from parameters of longitudinal LV deformation – peak systolic epicardial LS  (ß=0.293, p < 0.001; 95% CI 0.030 to 0.074), SRs (ß=0.274, p < 0.001; 95% CI 0.398 to 1.069) and epicardial PSS (ß=0.336, p < 0.001; 95%CI 0.925 to 2.019); from parameters of LV circumferential deformation – peak systolic endocardial CS (ß=0.254, p < 0.001; 95% CI 0.013 to 0.041), SR E (ß= -0.247, p < 0.001; 95%CI -0.556 to -0.173) and epicardial PSS CS (ß=0.206, p = 0.003; 95% CI 0.302 to 1.473); from left atrial mechanics - LA strain (ß=-0.231, p = 0.001; 95% CI -0.025 to -0.007).

Predictive power of model based on clinical variables (Killip class on admission, female gender, and history of atrial fib) for HF development was significantly improved when conventional ehocardiographic variables were added (LVEF, TAPSE, degree of diastolic function) (R2 from 0.076 to 0.197, p < 0.001). However, addition of MDI parameters (longitudinal and cirumferential PSS on epicardial levels) increased it further (R2 from 0.200 to 0.229, p < 0.001).

**Conclusion:** above from clinical and conventional echocardiographic parameters, amount of left ventricular post-systolic deformation in longitudinal and circumferential directions, expressed as LV indexes of post-systolic shortening, significantly improved early prediction of HF after pPCI.