Mechanical Dispersion as a powerful echocardiographic predictor of outcomes after Myocardial Infarction

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Introduction: Several studies have addressed the importance of transthoracic echocardiography (TTE) in risk prediction of subsequent adverse events after ST elevation myocardial infarction (STEMI). While several traditional echo parameters have a well-established prognostic value, data derived from 2D-Speckle Tracking Echocardiography (2DSTE) needs further investigation.

Objectives: To determine if 2DSTE parameters provide additional information beyond conventional echocardiography to predict long-term adverse outcomes in patients admitted with STEMI

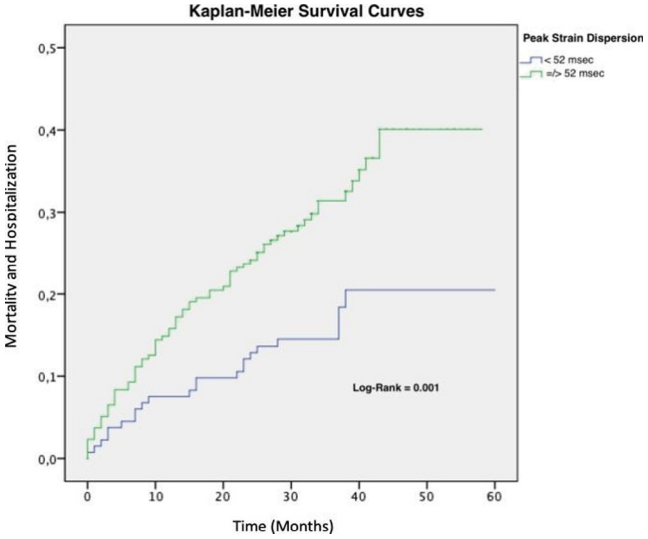
Methods: Retrospective, single-center study, that included all patients without previous cardiovascular events admitted with STEMI (who underwent primary coronary angioplasty) between 2015 and 2017. Patients with poor acoustic windows, severe valvular disease, irregular heart rhythm, and those who died during hospital stay were excluded. We reviewed all pre-discharge TTE to assess conventional parameters of LV systolic and diastolic function and data obtained by 2DSTE: global longitudinal strain (GLS) and peak strain dispersion (PSD), an index that is the standard deviation from time to peak strain of all segments over the entire cardiac cycle. Demographic and clinical data was obtained through electronic hospital records. Minimum follow-up was 2 years. The primary endpoint was a composite of all-cause mortality and cardiovascular re-admission at follow-up. Survival analysis was used to determine independent predictors of the primary endpoint.

Results: 377 patients were included, mean age 62±13 years, 72% male. Mean LVEF was 50±10% with 19% of patients having LVEF <40%. Mean indexed left atrium volume (LAVi) was 33±10 ml/m^2, mean GLS was –14±4%, and PSD was 60±22 msec. Average follow-up was 36±11 months, with a combined endpoint of mortality and hospitalization of 27% (n=102)

Univariate analysis of echocardiographic variables revealed an association between heart rate, LVEF, indexed LV end-systolic volume, indexed stroke volume, LAVi, GLS and PSD with the endpoint. However, on multivariate analysis only LAVi [HR 1.030 (95% CI 1.009 - 1.051), p-value = 0.005] and PSD [HR 1.011 (95% CI 1.002 - 1.020), p-value = 0.012] remained independent predictors of the primary endpoint.

We determined that a PSD value higher than 52 msec has a sensitivity of 76% and a negative predictive value of 83% for mortality and hospitalization, and that this cut-off point discriminates patients at a higher risk of events in Kaplan-Meier Survival analysis with a Log-Rank p-value=0.001.

Conclusion: PSD derived by longitudinal strain analysis is a promising prognostic predictor after STEMI. PSD outperformed conventional echocardiographic parameters in the risk stratification of STEMI patients at discharge.



Kaplan-Meier Survival Curves