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Correlations between left atrial strain parameters and left ventricular function in young patients presenting with acute ST elevation myocardial infarction

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Background: Previous studies demonstrated the role of left atrial (LA) deformation parameters in characterisation of left ventricular (LV) diastolic dysfunction. It is a marker of the severity of diastolic dysfunction; LA remodelling also proved to be a predictor of clinical outcome, therefore a prognostic marker in acute coronary syndromes.

Purpose: In this study we aimed to investigate the correlations between left atrial strain and conventional systolic and diastolic dysfunction parameters in a cohort of young patients with acute ST elevation myocardial infarction (STEMI) treated by primary PCI.

Material and methods: We included 56 consecutive patients in this study: 46 patients under 50 years of age with STEMI and 10 healthy age and sex matched controls. We performed conventional transthoracic echocardiography for all included patients. In addition to conventional echocardiographic parameters, LA strain curves were obtained for each patient using two-dimensional speckle tracking imaging with measurement LA deformation parameters.

Results: LV ejection fraction, LV global strain and peak LA systolic strain (PALS) were significantly reduced in STEMI patients compared to controls. PALS had significant correlation with 2D LVEF ($p = 0.00$), LV global longitudinal strain ($p = 0.03$), E wave ($p < 0.05$), E/e' ($p < 0.05$), left atrial volume and the type of diastolic dysfunction ($p = 0.06$). PALS also had inversre correlation with the presence of an occluded coronary artery at angiography.

PALS was higher in control group than in STEMI group (34.6 vs 20.4, $p < 0.05$). PALS values progressively decreased with worsening of LV diastolic dysfunction showing significant differences between all diastolic dysfunction grades. Using ROC (Receiver operating Characteristics) analysis we identified a cut off value of 25.9 (Sensibility 88%, Specificity 74%, AUC 0.94, CI 95%, $p < 0.05$) to discriminate between diastolic dysfunction and normal diastolic function.

Moreover, PALS was significantly different in patients with normal vs high LV filling pressures. Using ROC analysis we determined a cut off value of 14.5 for LA peak systolic strain to discriminate between the two subgroups, with excellent discrimination power, AUC 0.935, CI 95%, $p = 0.045$, Sensibility 100%, Specificity 91%. Therefore LA peak systolic strain could be considered a surrogate estimate of LV filling pressures.

Conclusion: LA peak systolic strain correlated significantly with LV systolic and diastolic function in young patients with acute myocardial infarction treated with primary PCI. Peak LA strain may be helpful as a complementary method to evaluate diastolic dysfunction in this patient population and may also improve the detection of elevated LV filling pressures.