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Deterioration in right ventricular strain precedes occurrence of pulmonary hypertension in patients with preclinical diastolic dysfunction

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Preclinical diastolic dysfunction (PDD) often progresses to heart failure and distinct clinical predictors for this transformation are yet to be defined. Since deterioration of longitudinal strain (LS) can occur before the changes of more conventional parameters, we assumed that right ventricular free wall longitudinal strain (RVLS) might start deteriorating before the pulmonary hypertension can be established.

Methods: We followed up 243 patients (143 female) 67±9 years with PDD for 3 years. All patients had an impaired relaxation or pseudo normal transmitral patterns and E/e' 8–13 at rest, normal NT-proBNP values, and systolic pulmonary artery pressure (sPAP) ≤30 mm Hg. PDD was diagnosed by stress echocardiography (SE) if E/e' ≥13, transmittal E wave deceleration time reduction >50ms, systolic pulmonary artery pressure (sPAP) <30 mmHg, and patients remained asymptomatic during SE. RVLS as average of RV free wall 3 segments values, left atrial peak reservoir LS (LALS) as average of two LA basal segments in four chamber view and left ventricular peak systolic global LS (LVGLS) were measured by speckle tracking (ST). ST and SE was performed with 6 months intervals. 35 healthy subject served as controls.

Results: Patients with PDD had higher RVLS, LVGLS, and lower LALS compared with controls (RVLS -23.2±4.2% vs -27.3±5.1%, p<0.001; LVGLS -17.8±5.2% vs -21.9±2.8%, p<0.001; LALS 39.7±3.7% vs 44.1±4.9%, p<0.002). 76 (31.3%) patients developed sPAP increase >30 mmHg at rest or SE during follow up of which 34 (44.7%) had dyspnea. Patients with increased sPAP had higher RVLS and lower LALS values at baseline compared with the rest of PDD patients without significant differences in other parameters (RVLS -17.9±2.8% vs -24.8±3.6%, p<0.002; LALS 37.7±2.3% vs 41.5±3.6%, p<0.003; LVGLS -17.4±4.8% vs -18.2±5.1%, p>0.05). Both LALS and RVLS correlated with LA end diastolic volume index (LALS r=0.51, p<0.01; RVLS r=0.54, p<0.01). Additionally RVLS was an independent predictor of sPAP rise (OR=2.7; 95% CI=2.43–6.92; p<0.01).

Conclusion: RVLS is an independent predictor of sPAP increase in patients with PDD.