

Determinants of the right atrial mechanics in systemic sclerosis

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Cardiac involvement in systemic sclerosis has been recognized as a common and adverse finding associated with poor prognosis. Speckle-tracking-derived strain is a well-known diagnostic tool to detect early changes in right ventricular function in systemic sclerosis patients, but no data are available about the utility of this new technique in the estimation of right atrial function. The aim of our study was to investigate the determinants of the right atrial mechanics in systemic sclerosis by using two dimensional (2D) speckle tracking technique.

Patients and methods: 70 systemic sclerosis patients (age: 57±12 years, 64 female, 32 limited cutaneous form) were investigated. Patients with pulmonary arterial hypertension, atrial fibrillation or significant left sided valvular disease were excluded. As parameters of the right ventricular systolic function, tricuspid annular plane systolic excursion (TAPSE) and right ventricular fractional area change (RVFAC) were measured. Right atrial area as well as basal, mid-cavity, and longitudinal dimensions of the right ventricle were measured in apical four chamber view. Maximal and minimal diameters of the inferior vena cava were measured in subxyphoid view, and collapsibility index was calculated. In addition to the spectral Doppler parameters of the tricuspid inflow (E, A), systolic (s), early (e') and late (a') diastolic myocardial longitudinal velocities were measured on the lateral tricuspid annulus. E/A and E/e' ratios were calculated. Right ventricular systolic pressure was estimated as a sum of the pressure difference across the tricuspid valve calculated using the modified Bernoulli equation and an estimate of mean right atrial pressure based on diameter and collapsibility index of the inferior vena cava. Right atrial reservoir, conduit and contractile strain were measured with 2D speckle tracking technique. Right atrial stiffness was calculated as ratio of E/e' to right atrial reservoir strain.

Results: Right atrial stiffness showed significant positive correlation with calculated right ventricular pressure ($r=0.284$; $p=0.043$) and E/e' ($r=0.778$; $p=0.000$) values, while significant negative correlation with tricuspid e' ($r=-0.595$; $p=0.000$), tricuspid a' ($r=-0.275$; $p=0.021$), tricuspid S ($r=-0.436$; $p=0.000$), and TAPSE ($r=-0.504$; $p=0.000$) (Figure 1.). No correlations were found between atrial strain results and parameters of the right ventricular systolic or diastolic function.

Conclusion: Our results suggest that speckle-tracking-derived right atrial stiffness is a robust parameter of the right atrial function, which shows strong correlation with the deterioration of the right ventricular systolic and diastolic function in systemic sclerosis.

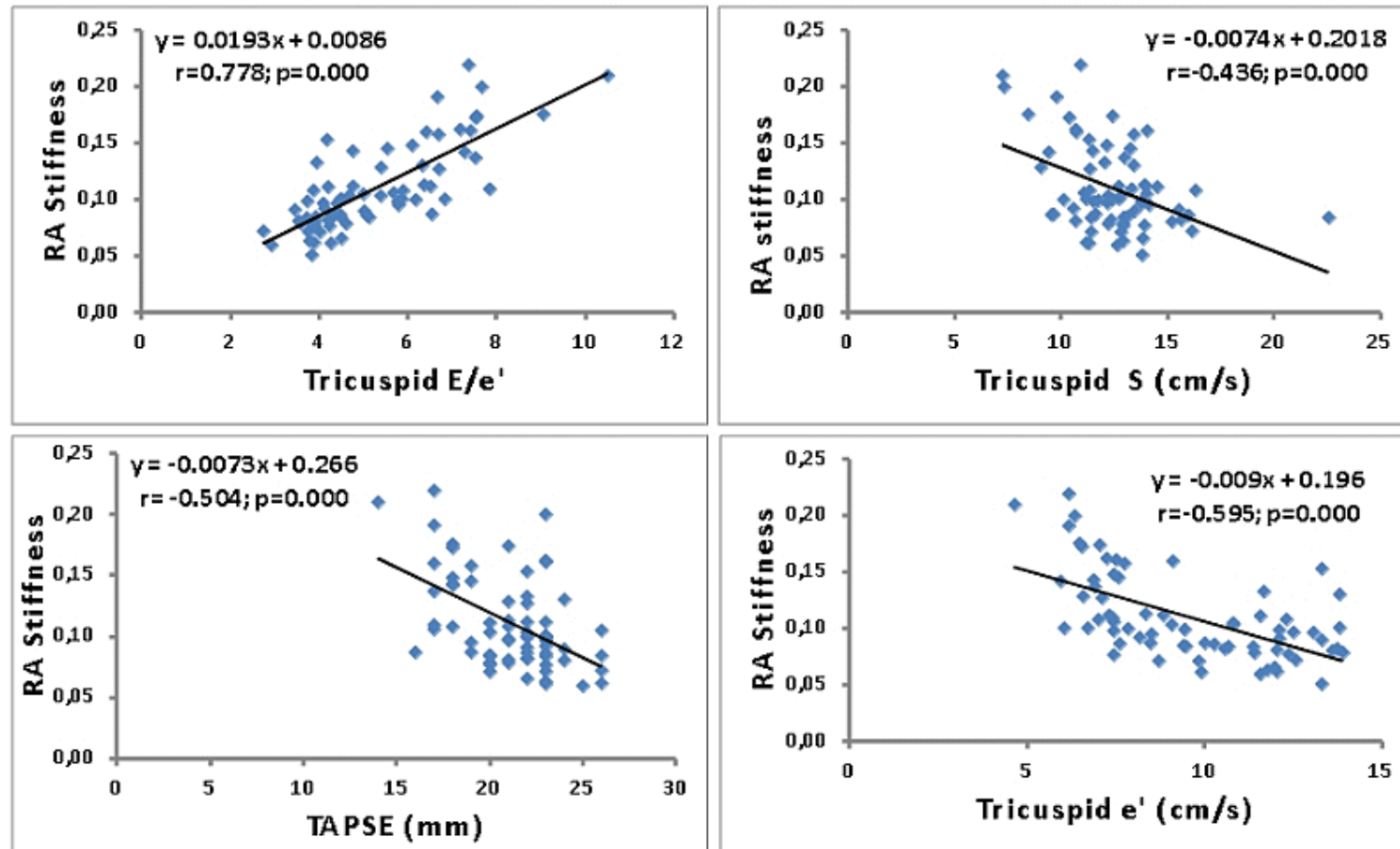


Figure 1.