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Hemodynamic determinants of tricuspid annular pulmonary systolic excursion (TAPSE)/systolic pulmonary arterial pressure (SPAP) ratio in Heart Failure with reduced Ejection Fraction

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Background: the TAPSE/SPAP ratio has gained a role as an easy-to-use surrogate of right ventricle-to-pulmonary circulation (RV-PC) coupling, showing a strong prognostic significance in heart failure (HF) patients. The hemodynamic determinants of TAPSE/SPAP ratio, as assessed by invasive approach, have not been fully clarified.

Aim: To identify the right heart hemodynamic variables correlated with TAPSE/SPAP in a HF with reduced EF (HFrEF) cohort, both at rest and during exercise.

Methods: 30 HFrEF patients (age 68±10 years LV EF 28±7) underwent to rest and exercise echocardiography and performed right heart catheterization within 24 hours. Bivariate correlations between TAPSE/SPAP ratio (at rest and during exercise), right heart hemodynamic variables, RV systolic function and NTproBNP have been explored.

Results: TAPSE/SPAP ratio at rest showed a moderate correlation with pulmonary artery wedge pressure (PAWP; r= 0.441; p= 0.039), pulmonary artery pressures (PAP systolic: r=0.481; p= 0.026; PAP diastolic: r=0.434; p= 0.043; mPAP: r= 0.476; p= 0.025), pulmonary vascular resistance and compliance (r= 0.475; p= 0.041). A stronger correlation was identified with right atrial (RAP systolic: r= 0.586; p= 0.017; RAP diastolic: r= 0.681; p= 0.006) and right ventricular pressures- in particular diastolic ones (RVP systolic: r= 0.584; p= 0.004; RAP diastolic: r= 0.652; p= 0.002). No significant correlation with NTproBNP and RV 3D EF emerged. Exercise TAPSE/SPAP ratio significantly correlated with right atrium (RAP systolic: r= 0.564; p= 0.036) and right ventricle systolic pressures only (RVP systolic: r= 0.789; p< 0.001).

Conclusions: TAPSE/SPAP ratio at rest showed a stronger correlation with invasively derived diastolic right heart pressure rather than pulmonary vascular bed pressures. A similar correlation was also observed for exercise TAPSE/SPAP ratio. This tight correlation with RV, rather than with vascular pressures, supports the significance of this ratio as a marker of RV adaptation to vascular overload.