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Prognostic value of exercise right ventricular-pulmonary arterial coupling in primary mitral regurgitation

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Background: Exercise-induced pulmonary hypertension (mPAP/CO slope >3mmHg/L/min) was recently associated with worse outcome in >moderate PMR. However, the prognostic value of right ventricle to pulmonary artery coupling (RVPAc) is unknown.

Purpose: Assess the prognostic value of RVPAc; determine the additional value of exercise over rest RVPAc and compare these findings to the mPAP/CO slope.

Methods: Cohort study including consecutive pts submitted to CPET-echo with >moderate PMR, no/discordant symptoms, preserved LV function and without >moderate concomitant valvular disease or atrial fibrillation (AF). Thorough assessment of RV systolic function and RVPAc (TAPSE/sPAP ratio) was obtained by echocardiography using a dedicated RV window. mPAP and CO were obtained by Doppler echocardiography. Primary outcome was the composite of all-cause mortality, cardiovascular hospitalization (CVH), new-onset AF and valvular intervention; secondary outcome was the composite of CVH and new-onset AF.

Results: A total of 128 consecutive pts (64±11 years, 61% men) underwent CPET-echo. Event-free survival rate was 55% and 46% at 1 and 2 years. Pts that reached the primary combined endpoint were significantly older, had larger left atrium indexed volumes (LAVi), higher proportion of grade 4 MR, lower absolute and normalized peak VO2, and a significantly higher mPAP/CO slope (2,1±0,8 vs.3,7±2,6). They had a significantly lower rest and exercise TAPSE/sPAP, RV global and free wall longitudinal strain, rest and exercise TAPSE and exercise RV free wall S'. Rest and low exercise TAPSE/sPAP scored the highest accuracy in predicting the primary combined endpoint among variables statistically significant in the univariate analysis and therefore were used in the multivariate model. Sequentially adding rest and low exercise TAPSE/sPAP significant independent variables in the multivariate model. They also correlated with new-onset AF and CVH; with rest and low exercise TAPSE/sPAP constituting significant steps (Fig 2). Replacing low exercise TAPSE/sPAP for mPAP/CO slope in the proposed model only slightly improved its accuracy of any of the multivariate models. Low exercise TAPSE/sPAP and mPAP/CO slope both correlated well with peak VO2 and VE/VCO2 slope.

Conclusion: Decreased rest or exercise TAPSE/sPAP are single point measures of RVPAc, associated with adverse outcome in pts with >moderate PMR and no/discordant symptoms. Low exercise TAPSE/sPAP has independent additional value over rest TAPSE/sPAP in predicting adverse events, with a similar accuracy as mPAP/CO slope. Low exercise TAPSE/sPAP is a potential alternative to mPAP/CO slope in this population and it may be simpler to adopt in clinical practice.



Central Illustration

Figure 2: Incremental prognostic value of TAPSE/PSAP at low exercise. The incremental value of TAPSE/PSAP at low exercise in predicting the composite outcome (Panel A), new onset AF and unplanned cardiovascular hospitalization (Panel B).

Atrial fibiliation = AF; IIR= Ilazzard ratio: Left atrium indexed volume = LAV; Mitral regurgitation = MR; Systolic purmonary artery pressure = sPAP; Triccspid annular plane systolic excursion = TAPD;

Panel A - Low exercise TAPSE/PSAP and combined cutcome.

Panel B - Low exercise TAPSE/PSAP and new onset AF and unplanned cardiovascula hospitalization.









