

RIGHT VENTRICULAR FUNCTIONAL RESERVE PREDICTS EXERCISE CAPACITY AND VENTILATORY EFFICIENCY IN PATIENTS WITH CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION

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Objectives: Although patients with pulmonary hypertension typically suffer from exertional dyspnea, hemodynamic assessment is generally performed at rest. We evaluated the left and right ventricular (LV and RV) volume response to exercise and their relation to functional capacity and ventilatory efficiency in patients with chronic thromboembolic pulmonary hypertension (CTEPH).

Methods: Fourteen CTEPH patients underwent cardiopulmonary testing (CPET), and cardiac magnetic resonance (CMR) imaging at rest and during supine bicycle exercise to near-maximal exertion with simultaneous invasive measurement of mean pulmonary arterial pressure (mPAP). The main outcome measures during CPET were peak-exercise oxygen consumption (VO_{2peak}) and the ventilatory equivalent for carbon dioxide (VE/VCO₂) at the anaerobic threshold.

Results: VO_{2peak} correlated with resting and peak-exercise mPAP ($r=-0.59$ and -0.52 , $P<0.05$) and stroke volume index (SVi; both $r=0.59$; $P<0.05$) and with the exercise-induced change in RV ejection fraction (EF; $r=0.60$, $P=0.03$). Similarly, VE/VCO₂ correlated with mPAP at rest ($r=0.64$, $P=0.02$), with resting and peak-exercise SVi ($r=-0.58$ and $r=-0.59$, $P<0.05$) and with the exercise-induced change in RVEF ($r=-0.69$, $P=0.009$). Both for VO_{2peak} and VE/VCO₂, no association was found with resting RVEF. On multivariate analysis, only the exercise-induced change in RVEF, and peak-exercise heart rate (HR) and mPAP were independent predictors (standardized beta=0.76, 0.61 and -0.43 respectively, $P<0.05$) and together explained 79% of the variance in VO_{2peak} . For VE/VCO₂, the exercise-induced change in RVEF was the single independent predictor (standardized beta =-0.69, $P=0.009$).

Conclusion: In CTEPH patients, exercise measures of RV function and hemodynamics reflect exercise capacity and ventilatory efficiency better than resting measures.

Figure 1

