

Right ventricular myocardial work characterisation in patients with pulmonary hypertension: association with invasive haemodynamic parameters

S.C. Butcher¹, C. Feloukidis², V. Kamperidis², J. Stassen³, F. Fortuni⁴, E. Vrana², S.A. Mouratoglou², A. Boutou², G. Giannakoulas², D. Playford⁵, N. Ajmone Marsan³, J.J. Bax³, V. Delgado³

¹Leiden University Medical Center, Leiden, Netherlands (The); ²Ahepa General Hospital of Aristotle University, Thessaloniki, Greece; ³Leiden University Medical Center, Department of Cardiology, Leiden, Netherlands (The); ⁴A.O.U. Citta della Salute e della Scienza di Torino, Division of Cardiology, Turin, Italy; ⁵University of Notre Dame Australia, School of Medicine, Fremantle, Australia

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Background: Non-invasive evaluation of indices of right ventricular (RV) myocardial work derived from RV pressure-strain loops may provide novel insights into RV function in pre-capillary pulmonary hypertension.

Purpose: This study was designed to evaluate the association between the indices of RV myocardial work and invasive haemodynamic parameters in a patient cohort with pulmonary arterial hypertension (Group I) or chronic thromboembolism pulmonary hypertension (Group IV).

Methods: The non-invasive analysis of echocardiography-derived RV myocardial work (Figure 1, upper panel) was completed in 51 patients (mean age 58.1 ± 12.7 years, 31% male) with Group I (78%) or Group IV (22%) pulmonary hypertension. Conventional echocardiographic measurements of RV systolic function, RV global work index (RV GWI), RV global constructive work (RV GCW), RV global wasted work (RV GWW) and RV global work efficiency (RV GWE) were compared with parameters derived invasively during right heart catheterisation (RHC).

Results: The median RV GWI, RV GCW, RV GWW and RV GWE were 620 (443 to 857) mmHg%, 830 (650 to 1206) mmHg%, 105 (54 to 169)

mmHg% and 87 (82 to 93)%, respectively. Compared to pulmonary artery systolic pressure and conventional echocardiographic parameters of RV systolic function (RV global longitudinal strain [GLS], tricuspid annular plane systolic excursion and RV fractional area change), RV GCW and RV GWI correlated more closely with invasively-derived RV stroke work index ($R=0.63$, $P<0.001$ and $R=0.60$, $P<0.001$, respectively) (Figure 1, lower panels). Invasively-derived pulmonary vascular resistance (PVR) correlated with RV GWW ($R=0.63$, $P<0.001$), RV GWE ($R=0.48$, $P<0.001$) and RV GLS ($R=0.58$, $P<0.001$). RV GLS correlated more closely with invasively-derived stroke volume index ($R=-0.57$, $P<0.001$) than RV GCW, RV GWI and RV GWE ($R=0.34$, $P=0.016$, $R=0.48$, $P<0.001$ and $R=0.47$, $P<0.001$, respectively).

Conclusions: In a patient cohort with Group I and Group IV pulmonary hypertension, indices of RV myocardial work were more closely correlated with invasively-derived RV stroke work index and PVR than conventional echocardiographic parameters of RV systolic function.

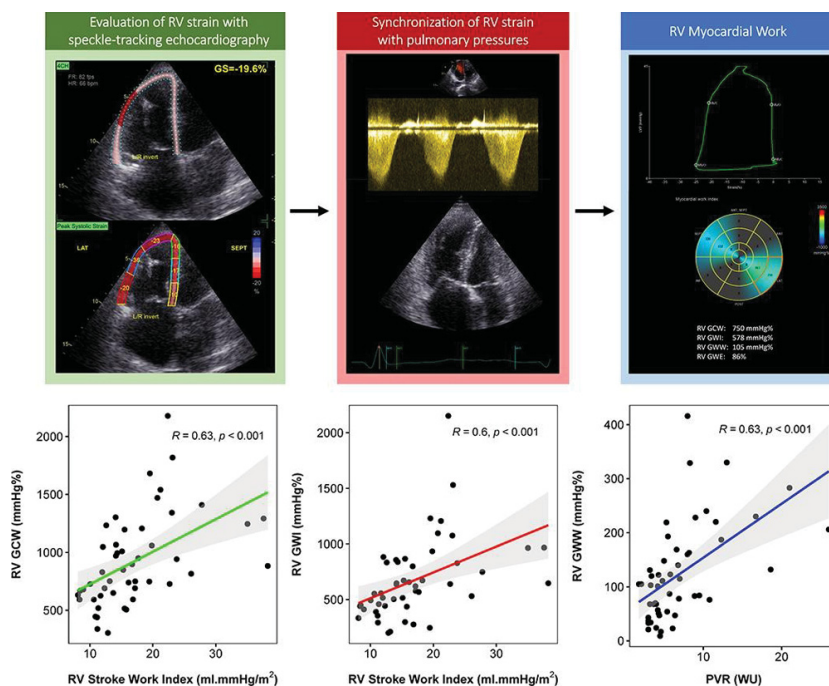


Figure 1. Method and correlations