The role of echocardiographic measurement of ventriculoarterial coupling (RVPAC) in critically ill patients

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Background: Right ventricular (RV) dysfunction is common and associated with worse outcome in critically ill patients. The right heart's ability to adapt to increased afterload with preserved ventriculoarterial coupling (RVPAC) is highly prognostic in non-ICU patients but it's role in the critically ill is still unclear. The aim was to assess RVPAC in a mixed ICU cohort in terms of feasibility, distribution, and prognostic significance.

Methods: This is a secondary analysis of a prospective study in a mixed ICU population. Echocardiography was performed within 24 hours from admission. To estimate RVPAC, TAPSE was divided by TRV.

Results: A total of 266 (65% of parent study) had measurements of both TAPSE and TRV. The median value of TAPSE/TRV was 0.84, IQR 0.67–1.10. Patients in the lowest quartile of RVPAC were older, had more often a history of hypertension, cardiac and pulmonary disease. Sepsis, a cardiovascular or respiratory reason for admission were more common. They had a higher heart rate, lower ejection fraction and displayed more impaired RV function with lower TAPSE, RV S´ and FRAC. Values of TRV were higher. In a logistic regression analysis, TAPSE/TRV (OR 0.22 [0.06–0.90], p=0.035) were associated with an increased risk of death after adjustment for SAPS 3, age and LVEF. TAPSE and TRV as singe parameters were not significant.

Conclusions: RVPAC measured as TAPSE/TRV is a promising and feasible echocardiographic parameter in critically ill patients. RVPAC may be a better prognostic marker than TAPSE and TRV alone.