

Left heart, right heart, and ventricular-ventricular interaction variables in children with pulmonary hypertension

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Abstract:

Background: Determination of biventricular dimensions, function and ventricular-ventricular interaction is an essential part of the echocardiographic examination in adults with pulmonary hypertension (PH), however, according studies in children are limited. We hypothesized that variables of left and right heart dimensions/function and ventricular-ventricular interaction (VVI) variables might indicate disease severity and progression in children with PH.

Methods: Left heart, right heart, and VVI variables were echocardiographically obtained and correlated with NYHA functional class (FC), surrogate marker of right atrial stretch (N-terminal-pro brain natriuretic peptide; *NT-proBNP*), and prognostic hemodynamic variables [i.e. pulmonary vascular resistance index (PVRi)] in 57 children with PH.

Results: The ratio of systolic pulmonary arterial pressure divided by systolic systemic arterial pressure (sPAP/sSAP) and also the PVRi correlated well with the left ventricular eccentricity index (LVEI) ($p < 0.001$). The LVEF decreased with increasing sPAP/sSAP ratio and PVRi in our PH children ($p = 0.001$). Patients with higher NYHA FC had lower LVEF and higher LVEI values ($p < 0.001$). The sPAP/sSAP ratio and PVRi paralleled the right ventricular (RV)/LV and right atrial (RA)/LA dimension ratios ($p < 0.01$). When stratified by NYHA-FC, with more severe exercise intolerance in our PH children, RV and RA dimension variables increased, and the tricuspid annular plane systolic excursion (TAPSE) decreased. The NT-proBNP values positively correlated with the sPAP/sSAP ratio ($p < 0.001$) and the NYHA FC ($p < 0.01$).

Conclusions: The VVI variables LVEI and the RV/LV dimension ratio were associated with clinical worsening, detrimental hemodynamics and increased NT-proBNP levels, thus highlighting the value of ventricular interdependence in clinical management of pediatric PH.