Right ventricular pulmonary arterial coupling in patients with implanted left ventricular assist devices

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Background: Both the right ventricular (RV) contractile function and pulmonary arterial (PA) pressure influence clinical outcomes in patients supported with left ventricular assist devices (LVADs), but the impact of RV-PA coupling is unknown.

Purpose: This study aimed to determine the prognostic impact of RV-PA coupling in patients with implanted LVADs.

Methods: Patients with implanted third-generation LVADs were retrospectively enrolled. The RV-PA coupling was assessed preoperatively by the ratio of RV free wall strain (RVFWS) and noninvasively measured peak RV systolic pressure (RVSP). The primary endpoint was a composite of all-cause mortality or right heart failure (RHF) hospitalization. Secondary endpoints consisted of all-cause mortality at a 12-month follow-up and RHF hospitalization.

Results: A total of 72 patients with good RV myocardial imaging were included. The median age was 57 years, 67 patients (93.1%) were men and 41 (56.9%) had dilated cardiomyopathy. A receiver-operating characteristic analysis (AUC 0.703, 51.5% sensitivity, 94.9% specificity) was used to identify the optimal cutoff point (0.28%/mmHg) for the RVFWS/TAPSE threshold. Event rates were estimated using the Kaplan-Meier method showing an association with an increased risk for the primary endpoint of death or RHF hospitalization (89.47% vs. 30.19%, p<0.001). A similar observation applied to all-cause mortality (47.37% vs. 13.21%, p=0.003) and RHF hospitalization (80.43% vs. 20%, p<0.001).

Conclusion: An advanced RV dysfunction assessed by RV-PA coupling may serve as a predictor of adverse outcomes in patients with implanted LVADs.