

## Editorial



# Clinical Implication of Echocardiographic-Based Right Ventriculo-arterial Coupling in Cardiac Resynchronization Referred Patients

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### Conflict of Interest

The authors have no financial conflicts of interest.

Heart failure results in high adult hospitalization and mortality rates worldwide. In developed countries, the prevalence of heart failure is reported in up to 2% of the total adult population and 10% in those older than 70 years.<sup>1)</sup> Furthermore, the mortality of heart failure is very high after initial diagnosis, around 30% at 1 year and 50% at 5 years.<sup>2)</sup> In the acute heart failure state, in-hospital mortality is reported at 28%, while that of cardiogenic shock is 40% to 80%.<sup>3)</sup>

Cardiac resynchronization therapy (CRT) has been established as an effective treatment for symptomatic advanced heart failure patients with wide QRS duration despite having exhausted all other optimal medical therapy.<sup>4)</sup> CRT can improve hospitalization and mortality rates by correcting unfavorable left ventricular hemodynamics or dyssynchrony.<sup>5,6)</sup> However, since nearly one-third of patients have not experienced any benefit from CRT implantation at a significant financial cost, identifying CRT responders remains a challenging task in clinical practice.<sup>7,8)</sup> Improvements of left ventricular systolic function and synchrony were commonly evaluated in previous studies. The right ventricle (RV) is also a crucial contributor to prognosis of advanced heart failure.<sup>9,10)</sup> Therefore, the prognostic value of RV function for CRT referral patients is as yet to be identified and needs further evaluation through clinical study.

In this issue of *Journal of Cardiovascular Imaging*, Bragança et al.<sup>11)</sup> investigated the clinical correlations and prognostic values of right ventriculo-arterial coupling (RV-PA) in heart failure patients undergoing CRT. They demonstrated that RV-PA coupling estimated by tricuspid annular plane systolic excursion and pulmonary artery systolic pressure ratio (TAPSE/PASP) showed excellent discriminative power for predicting response to CRT, and that PASP was independently associated with overall mortality in this group of heart failure patients. In addition, they suggested a novel cut-off value of baseline TAPSE/PASP ratio as 0.44 mm/mmHg for detection of a CRT non-responder, with good accuracy (area under the curve 0.76). Also, among CRT responders, improvements of RV-PA coupling were noted during follow-up in those showing elevated TAPSE and TAPSE/PASP ratio. However, this study has limitations of a small sample size and performed at a single center with a retrospective design in which selection bias was inevitable. Moreover, the echocardiographic-based TAPSE/PASP was not compared with the gold-standard method of right heart

catheterization or cardiac magnetic resonance. Nonetheless, these findings provide a basis for consideration of right heart and pulmonary circulation in CRT referred patients using the easily performed echocardiographic-based TAPSE/PASP ratio method. This approach deserves further exploration.

In conclusion, Bragança et al.<sup>11)</sup> found that RV-PA coupling as estimated by TAPSE/PASP ratio can be used as a significant prognostic marker in heart failure patients undergoing CRT. Further studies are warranted in numbers large enough to be statistically significant when using a prospective design.

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