

ACCURATE AND REPRODUCIBLE MEASUREMENTS OF RIGHT VENTRICULAR FUNCTION IN DAILY PRACTICE

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REFER TO THE PAGE 113-120

Traditionally right ventricle (RV) has been considered as a conduit or passive-dependent chamber mainly affected by loading conditions.¹⁾ Therefore, except for special situations such as pulmonary hypertension or complex congenital heart disease, main interest has been focused on left ventricle (LV).²⁾ One of the reasons of eagerness for left sided parameters may come from complexity of RV morphology and different movement of RV during systole and diastole compared to LV.³⁾ Therefore accurate measurement of RV volume and function in daily practice has lots of barriers to overcome. However, more and more evidences have suggested RV myocardial function itself has independent prognostic value not only in primary RV disease but also in LV diseases such as dilated cardiomyopathy or ischemic cardiomyopathy.^{4,5)} Therefore need for reporting RV function is increasing in several disease entities. The causes of RV dysfunction in LV dysfunction can be explained by multiple mechanisms. Firstly, LV failure increase in pulmonary venous and arterial pressure, partly as a protective mechanism against pulmonary edema, then induce RV dysfunction; secondly, the same cardiomyopathy process may simultaneously affect the RV; thirdly, RV myocardial ischemia due to concomitant coronary artery disease; fourthly, ventricular inter-dependence due to septal dysfunction or limited pericardial compartment.³⁾ RV dysfunction ultimately cause systemic venous congestion and reduced renal perfusion, thereby it deteriorates neurohormal status.⁶⁾

Current gold standard for accurate measurements of RV systolic function is cardiac magnetic resonance imaging (CMR)-derived ejection fraction from stacked short axis cine images scanned with steady-state free precession sequence.⁷⁾ The most advantage of CMR is accurate 3-dimensional measurements of

RV systolic and diastolic volume without geometric assumption. However, CMR-derived RV volume measurement takes time and needs more learning period than conventional 2-dimensional echocardiographic measurements because of handling of RV inflow plane and outflow plane. Most of all, patients need undergo additional expensive exam. In this point of view easy and reproducible way of measurements are deadly needed with conventional echocardiography. Currently, RV fractional area change, tricuspid annular plane systolic excursion (TAPSE) and tricuspid annular velocity are widely used.⁸⁾ However, RV fractional area change has limitations in terms of poor endocardial border delineation and negligence of geometric change. As RV changes from eccentric-crescent shape to oval shape as increase in preload or afterload, this limitation might be augmented in really sick RV. Easy and practical method is measurement of TAPSE or tricuspid annular velocity by tissue Doppler imaging based on concept that the RV long axis fiber movements mainly contribute to systolic function. But these two parameters are largely affected by tethering motion of adjacent myocardium. Speckle tracking echocardiography or velocity vector imaging can provide index of longitudinal myocardial deformation by escaping tethering effects.^{9,10)} In this issue, Park et al.¹¹⁾ introduced global longitudinal strain of RV with validation by comparison with CMR-derived RV ejection fraction. One of the interesting findings of the study is that the investigators used vendor independent analyzing software, velocity vector imaging. With applying this program, RV strain can be measured during every conventional echocardiography examination. Algorithm of the tracking system has advantages for measuring longitudinal strain in thin walled myocardium such as RV or left atrium. But, in this study, the authors skipped assessment of inter-vendor measurements variability with an analyzing software. Although the authors commented in the limitation, this step

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should be done and clarified before using these results in daily practice, because we need specific cut-off value for RV dysfunction which can be used in any vendors like ejection fraction. Regarding prediction of outcome, RV strain measured by vendor independent program should show incremental value to left sided parameters which is more reproducible and more widely used in daily practice. On the point of view, if this study could have included LV strain, the result would be more solid. Inclusion of EuroScore II¹²⁾ as a compact covariate for multivariable analysis seems reasonable in the situation of small number of study end-points. Despite some limitations, the study results can provide new way of accurate and convenient RV functional measurements in busy echo-lab.

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