

## บทสรุปการวิจัย

# Transthoracic echocardiography in critically ill patients: Can we use a new parameter for diagnosis of RV dysfunction?

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In the current issue of Thai Journal of Critical Care Medicine (TJCCM), Dr Sangnopakunsi and colleagues reported the accuracy of transthoracic echocardiography (TTE) for diagnosis of right ventricular dysfunction (RVD) in critically ill patients compared to using pulmonary artery catheter (PAC). She concluded that using TTE resulted in acceptable sensitivity and accuracy for diagnosis of RVD when using PAC as a gold standard. The authors also introduced the RVD score, which was derived from multiple logistic regression analysis, as a novel diagnostic tool for RVD. This score is calculated by substitution of 1 in each of the followings is demonstrated: 1) the present of LV D-shape, 2) loss of RV triangle and 3) the ratio of right ventricular end systolic area to left ventricular end systolic area (RVESA: LVESA) is greater than 0.65, otherwise the score is replaced by 0. The score above 6.0 defined as positive RVD score with a sensitivity of 70.6% and a specificity of 90.9%. The RVD score is equal to  $(3.5 \times \text{LV D-shape}) + (1.5 \times \text{loss of RV triangle}) + (5 \times [\text{RVESA: LVESA above } 0.65])$ , which is worth to apply in clinical practice. Moreover, echocardiography can also be used for assessing other important data in critical ill patients e.g. RV and LV volume, function, intra-cardiac or intra-arterial thrombus, significant pericardial effusion, or major valvular pathology that might assist the clinicians in taking care of their patients.

Unfortunately, critically ill patients are often placed on mechanical ventilation, adequate imaging is frequently limited due to interposition of the inflated lung between the heart and chest wall. To position them is usually difficult due to restraints and monitoring devices attached to their chest. Moreover, some of them have chronic pulmonary disorders, e.g. COPD, bronchiectasis. It is, therefore, tough to be examined with a TTE. Vignon et al<sup>(1)</sup> mentioned that imaging quality from TTE was good in only 70 from 128 procedures (55%) in I.C.U. patients. The image quality and adequacy from TTE should, therefore, be pointed out in this study. To improve the imaging quality, the harmonics and contrast technologies are beneficial.<sup>(2)</sup> Also, transesophageal echocardiography (TEE) will be preferable in clinical situations where TTE is likely to fail or be suboptimal. Costachescu et al<sup>(3)</sup> also demonstrated the superiority of TEE compared to conventional monitoring with PACs in diagnosing and excluding significant causes of hemodynamic instability in postoperative cardiac surgical patients.<sup>(4)</sup> Echocardiography should then be the investigation of choice to assess patients with hemodynamic instability due to unknown causes.

One of the established values to quantify RV dilatation is the ratio between the RV end-diastolic area and LV end-diastolic area (RVEDA: LVEDA). Moderate RV dilatation usually corresponds to a diastolic ratio  $> 0.6$  and severe RV dilatation to a ratio  $\geq 1$ .<sup>(5)</sup>

The authors introduced the novel marker that correlates to RVD, named "RVD score". The most important parameter is the present of RVESA: LVESA ratio above 0.65, as it would be multiply by 5 and the cut-off point of the score is 6. So, the accuracy of measurement of those areas is essential. Lang et al<sup>(6)</sup> mentioned that approximately 30% of patients in the prior studies would have suboptimal endocardial delineation by fundamental imaging. These resulted in the measurement difficulty, especially in contouring the endocardial borders. The author unsealed only kappa index, which is more famous in rating inter-rater agreement for categorical data. It would be better to show all the agreement results and the method of patient selection for being examined by either one or both investigators.

Beyond the images quality and the measurement technique that may affect the data acquisition, in this study group, there were 10 (16.9%) and 8 (13.6%) values measured from known pulmonary hypertension and known valvular heart disease respectively. The hemodynamic data from PAC in some cases might be affected by their underlying condition as well.

In conclusion, TTE could be an accurate and non-invasive tool for assessment of RV dysfunction compared to PAC and is helpful in diagnosing and excluding significant causes of hemodynamic instability in critically ill patients. However, the image quality might be insufficient in some patients. Combined use of TTE and TEE help enhance their advantages, although it would be more invasive. This combination use should, therefore, be done in only selected cases. The RVD score is attractive but is needed to evaluate in larger cohorts.

### References :

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