Authors’ Reply

To the Editor:

We write in response to the letter by Essandoh et al. regarding our report “Echocardiographic Predictors of Successful Extracorporeal Membrane Oxygenation Weaning after Refractory Cardiogenic Shock.” In our report, we suggested that improvement of lateral e’ velocity and tricuspid annular S’ velocity during venoarterial extracorporeal membrane oxygenation (ECMO) flow studies might better represent cardiac reserve from a recovering heart than conventional echocardiographic parameters at minimal flow.

In their letter, Essandoh et al. point out limitations regarding linear measures of ventricular function. They further state that it is interesting that the predictive performance of left ventricular ejection fraction (LVEF) and right ventricular (RV) ejection fraction was not as good as that of S’ or e’ velocity. We would like to clarify that we measured LVEF using the modified Simpson rule and RV fractional area change, not RV ejection fraction. Although we agree with Essandoh et al. that single-point interrogation depicting longitudinal tissue displacement does not fully represent true myocardial mechanics, we have different a view regarding the clinical implications of e’ and S’ velocities. First, the relative load independence of e’ velocity has been described in previous studies. The e’ velocity has been validated against invasive hemodynamic measures and is correlated with τ, the preload-independent measure of isovolumic relaxation. On the contrary, one apparent limitation of LVEF is its load dependence, especially afterload. Better prognostic values of e’ and S’ velocities over LVEF in ECMO flow studies can be explained by the increased preload and decreased afterload by reducing ECMO flow support during ECMO flow studies. In fact, as we stated in our report, LVEF increased even in the failed weaning group, as flow was reduced to 30% to 50% of baseline flow; this is due to the increased preload and decreased afterload. Second, although RV fractional area change reflects both the longitudinal and radial components of RV contraction, the reproducibility is not as good as for RV S’ velocity. Therefore, RV S’ velocity may be more appropriate for serial repeated measurements during flow studies. Third, in our experience, practicality is also important in managing ECMO patients. Tissue Doppler–derived velocity is an extensively validated parameter in various cardiac diseases and is relatively simple to measure, even in patients in the supine position. Essandoh et al. also suggest that load-independent echocardiographic measures of longitudinal muscle function, such as global longitudinal strain, provide better assessments of biventricular function and are better predictors of ventricular recovery in patients with cardiogenic shock. LV global longitudinal strain is an angle-independent parameter with established prognostic value in various cardiovascular diseases, and complete evaluation of LV mechanics can be assessed, including longitudinal, radial, circumferential, and torsion mechanics. Therefore, LV global longitudinal strain might have further additive value for the recovery of ventricular function; however, previous studies have shown it to be a load-dependent indicator, similar to LVEF.

We applaud Essandoh et al. for their suggestion regarding the evaluation of myocardial recovery in ECMO patients with multiple echocardiographic indices and hemodynamic parameters, and we hope they continue their valuable investigations.

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REFERENCES


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