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Assessment of Cardiac Function Following Traumatic Brain Injury

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Keywords

traumatic brain injury; echocardiography; cardiac

We would like to thank Venkata et al. for their comments (1) regarding our manuscript recently published in Critical Care Medicine (2), which described the development of early systolic dysfunction following moderate-severe traumatic brain injury (TBI).

Venkata et al. discussed important points about the assessment of systolic and diastolic function in our study, which require further clarification. We agree that the use of fractional shortening could overestimate the true systolic function of the heart (especially in the presence of regional abnormalities beyond the cardiac base), as we discussed in the limitations section of our manuscript. Venkata et al also commented that because we collected diastolic function variables, we should also be able to quantify systolic function using Simpson's biplane method. This is not the case, because assessment of most diastolic variables requires an image of the mitral valve annulus and apparatus for accurate quantification of velocities using pulsed-wave and tissue Dopper (3); but an image of the mitral valve annulus can be achieved despite having foreshortening or an incomplete image of the left ventricular apex. Therefore, diastolic variables were collected, despite the inability to capture complete ventricle measurements with minimal foreshortening, which is necessary for volumetric assessment of the left ventricle function using Simpson's biplane method (4).

Given the unique limitations of neurocritically ill severe TBI patients (especially in the early stages with fluctuating intracranial pressures), placing these patients in a left-lateral

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decubitus position to obtain complete apical images with minimal foreshortening is generally not feasible. As fractional shortening has excellent reproducibility and has been used successfully in many clinical studies (5), our methods may demonstrate a more generalizable and “real-world” approach for intensivists caring for the severe TBI population.

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