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Letter by Nagueh et al Regarding Article, "Tissue Doppler Imaging in the Estimation of Intracardiac Filling Pressure in Decompensated Patients With Advanced Systolic Heart Failure"

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To the Editor:

We read with interest the article by Mullens et al,[1] which reported that, in patients with decompensated systolic heart failure, the early transmitral velocity to tissue Doppler mitral annular early diastolic velocity (E/Ea) ratio may not be reliable in predicting filling pressures, especially in patients with larger left ventricular volumes, lower cardiac indices, and cardiac resynchronization therapy pacing. We want to express caution in interpreting these results because they contradict abundant data previously published and validated.[2] Our concern is that the conclusions proffered may convey the wrong message about the use of E/Ea as a noninvasive estimate of filling pressures in patients with heart failure and left ventricular systolic dysfunction, in whom the ratio generally works well. The first major issue is the composition of the study group in the Mullens et al article. Significant mitral regurgitation was present in 22% of the patients, and E/Ea does not correlate well with pulmonary capillary wedge pressure (PCWP) in these patients. Second, half of the patients had a cardiac resynchronization therapy device, and many had a prolonged QRS duration with variable degrees of dyssynchrony. The E/Ea accuracy against invasive measurements of left ventricular pressures has not been specifically evaluated in these patients, and the ratio can be inaccurate.[3]

Questions about the measurement of PCWP also exist. The authors state that PCWP was measured in a supine position, but imaging was acquired in a left lateral decubitus position. This fact may weaken the relationship between Doppler and hemodynamic variables because pulmonary venous return varies with position,[4] and patients were rolled onto their left side after pressure measurement. In addition, the measured pressure is altered by a similar magnitude to the change in the level of the catheter in the vascular system, which shifts with body position. Aside from these factors, verifying an accurate PCWP in pulmonary hypertension (in this study, the mean pulmonary artery pressure was 34 ± 11 mm Hg) requires confirmation by oxygen saturation or fluoroscopy. The former was not performed, and the text is confusing relative to the latter: It first states that it was used, but later the lack of its use is mentioned as a limitation. Finally, PCWP was <15 mm Hg in a large number of patients 12 hours after being admitted in New York Heart Association class III to class IV heart failure, which is highly unusual. For these reasons, it is possible that the PCWP measurements were not entirely accurate in some patients.

The Doppler illustrations raise doubts about the accuracy and reliability of tissue Doppler recordings. It is questionable that these are adequate for analysis. Figure 5 shows poor alignment of the Doppler beam for the lateral tissue Doppler velocities and a sample volume that appears in the left atrial wall instead of the mitral annulus. The displayed Doppler spectral envelope is broad and poorly defined, which leads to considerable and unacceptably high interobserver variability.

In summary, we believe the work by Mullens et al draws attention to the need for continued investigation to clarify the clinical use of the E/Ea ratio in various groups of patient with systolic heart failure. However, for the reasons cited and the abundant previous literature in patients with systolic heart failure, we emphasize that the E/Ea ratio, even with its known limitations, works well for estimating filling pressures in the majority of individuals. Therefore, while awaiting additional studies, we encourage its continued use in this group of patients.

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Disclosures

None.

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References

1. Mullens W, Borowski AG, Curtin RJ, Thomas JD, Tang WH. Tissue Doppler imaging in the estimation of intracardiac filling pressure in decompensated patients with advanced systolic heart failure. *Circulation*. 2009;119:62–70.
2. Nagueh SF, Appleton CP, Gillebert TC, Marino PN, Oh JK, Smiseth OA, Waggoner AD, Flachskampf FA, Pellikka PA, Evangelista A. Recommendations for the evaluation of left ventricular diastolic function by echocardiography. *J Am Soc Echocardiogr*. 2009;22:107–133.
3. D'Souza KA, Mooney DJ, Russell AE, MacIsaac AI, Aylward PE, Prior DL. Abnormal septal motion affects early diastolic velocities at the septal and lateral mitral annulus, and impacts on estimation of the pulmonary capillary wedge pressure. *J Am Soc Echocardiogr*. 2005;18:445–453.
4. Tanabe K, Yoshitomi H, Oyake N, Asanuma T, Ohta T, Ishibashi Y, Shimada T, Morioka S, Moriyama K. Effects of supine and lateral recumbent positions on pulmonary venous flow in healthy subjects evaluated by transesophageal Doppler echocardiography. *J Am Coll Cardiol*. 1994;24:1552–1557.

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