LETTERS TO THE EDITOR

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Reduced and delayed untwisting of the left ventricle in patients with hypertension and left ventricular hypertrophy: a study using two-dimensional speckle tracking imaging

We read with interest the study by Takeuchi et al., which elegantly lends weight to the critical role of untwisting in normal and abnormal diastolic function. However, we would like to raise two important methodological issues in the use of speckle tracking imaging (STI) to assess torsion:

1. The need for further interpolation of STI data. The STI algorithm includes cubic spline interpolation and provides estimation of rotation in the six predefined segments at each frame. Because current 2D echocardiography allows imaging only in one plane at a time, changes between acquisition of the apical and basal short-axis images in heart rate or frame rate, as documented by these authors, may result in the STI algorithm estimating rotation for frames at different time points at the apex and base. Although temporal normalization overcomes intersubject differences in heart rate, it does not prevent deduction of basal rotation from apical rotation values at different time points in the cardiac cycle which results in erroneous calculation of torsion or twist. A further cubic spline interpolation of the temporally normalized apical and basal rotation data overcomes this issue by ensuring data from the same time points can be deducted. Although this is potentially labor intensive, customized automated algorithms may facilitate this.

2. The measurement of untwisting and untwisting rate from end systole. Because peak torsion, which is the onset of untwisting, may be delayed beyond aortic valve closure, particularly, as these authors and others have shown, by increased LV mass, we believe that the untwisting should be measured from peak torsion rather than end systole. Measurement of untwisting from end systole may result in a significant underestimation of the gradient of untwisting (e.g. in this study, Table 3, untwisting at t = 5%, for the severe left ventricular hypertrophy group, a negative value does not represent true untwisting).

Both timing and velocity of untwisting may be important in diastolic dysfunction and the parameter negative torsion acceleration incorporates both these aspects of torsional dynamics and may be a useful parameter of diastolic function. In the present study, because the authors have calculated untwisting as a percentage, the units of untwisting rate should have calculated untwisting as a percentage per millisecond.

We commend the authors on this excellent work but emphasize the importance of consistent and reproducible methodology for the ongoing study of left ventricular torsion.

References


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We thank Dr Burns for the interest in our work and on the appropriate comments about the methodological issues in the use of 2D speckle tracking imaging (STI) to assess left ventricular (LV) twist, i.e. interpolation of STI data and measurement of untwisting.

Left ventricular twist has been defined as apical rotation–basal rotation. If time-