Are obesity and left ventricular dysfunction entwined?

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This editorial refers to ‘Evaluation of left ventricular rotation in obese subjects by velocity vector imaging’ by Y. Deng et al., on page 424 in this issue.

Our understanding of left ventricular (LV) function and its description using echocardiographic techniques continues to evolve. From measurement of systolic function by ejection fraction, Tissue Doppler parameters are now used to evaluate systolic and diastolic function in the short- and long-axis. However, it is now recognized that LV function also involves twisting or torsion. LV torsion results from differences in contraction of the subepicardial and subendocardial fibres. Although its overall importance is still uncertain, Borg and Ray have proposed a unifying framework for progressive heart failure where LV torsion increases in early diastolic dysfunction but reduces in advanced diastolic and progresses in systolic heart failure.1

Velocity Vector Imaging is a relatively new technique that uses speckle tracking to give quantitative data on myocardial motion in the long axis, the short axis, and on rotation. These measurements are all angle independent which is a potential advantage over TDI techniques, and has therefore been applied in left heart, right heart, and congenital disease.2–7

Obesity is one of the epidemics of our time. Overweight and obese patients make up at least 75% of patients referred for outpatient echocardiography.8 Body mass index (BMI) correlates with LV mass and wall thickness. However, obese patients have also been shown to develop LV dysfunction and, even in the presence of a normal ejection fraction, there are subclinical changes in LV structure and function. These changes are independent of blood pressure, age, gender, and LV mass.

One of the challenges in assessing obese patients is that obesity significantly reduces the accuracy of transthoracic 2D echocardiography. The accuracy of 2D echocardiographic measurements have been shown to fall significantly when BMI is greater than 25. Previously, 3D echocardiography and cardiac MRI have proved more accurate in this patient group.9 Current standard techniques utilize LV TDI, myocardial Doppler imaging, and strain/strain rate imaging indices.10

The study by Deng et al.11 in this issue reports that using Velocity Vector Imaging to measure abnormal LV rotation is a feasible and reproducible method for the detection of early subclinical LV dysfunction in obese subjects. This was a prospective study involving 30 obese and 30 lean individuals. Peak rotation, twist and torsion of the left ventricle were studied using this echo technique. Variability in torsion parameters was low: a measure of the possible usefulness of this technique and also of the assiduous work of the investigators. Of note, the mean BMI for the obese group was 31, which is relatively low compared with the BMI in patients increasingly attending hospital, for example, for bariatric surgery. As BMI rises, echo becomes more challenging, so the relatively low BMI in the obese group impacts on the study’s findings. The authors report alterations in LV mass and mitral filling parameters and significantly reduced apical torsion, which would seem both to accord and extend our current understanding of LV mechanics in obesity.

The increasing incidence of obesity will continue to challenge echocardiographic departments. Many obese patients are breathless and some have a cardiac pathology as a contributor. We need readily and reproducibly measurable parameters that identify these patients. Furthermore, these parameters should correlate with other measures of LV dysfunction; e.g. B-type natriuretic peptide and guide therapy.

If clinicians are to utilize Velocity Vector Imaging in their assessment of obese patients, they will not only need convincing of the reproducibility of these data but also that these are superior to other parameters and clinically relevant. The data from Deng et al. demonstrate early promise for Velocity Vector Imaging as an identifier of early LV mechanical dysfunction in obese patients.

References


