LETTERS TO THE EDITOR

Assessment and relevance of ventricular wall stress in heart failure

We read with great interest the article by De Simone et al.,1 published in the European Heart Journal. By using M-mode echocardiography, the authors examined the relationship between left ventricular (LV) mass and incident heart failure not attributable to myocardial infarction. LV hypertrophy (LVH) or ‘excess’ of LV mass was found to be an independent predictor of incident heart failure. To quantify this so-called ‘excess’ of LV mass, expected normal values were calculated based on body height, gender, and stroke work. The latter was defined by the authors as systolic blood pressure times Teichholz-based stroke volume. In contrast to the used method, we prefer to assess stroke work in accordance with its physiological definition as the area within the pressure–volume loop, which is the standard method in experimental studies and is also feasible in patients.2 In the present study, systolic cuff blood pressure was obtained,3 which appears to be a further limitation since only LV pressure is decisive for LV wall stress.

In addition, an M-mode-based echocardiographic approach was used to assess LV wall stress. In a recent study on patients with non-ischaemic LV dysfunction, we compared an echocardiography-based method with a thick-walled sphere model,4 using parameters derived from cardiac magnetic resonance (CMR) imaging,5 which is the generally accepted reference method for assessing cardiac volumes and mass. The echocardiography-based method systematically underestimated LV wall stress.6 The extent of underestimation was proportional to the wall stress.7

As regards the present manuscript, a moderately (≤5%) increased LV end-systolic wall stress was found in patients with increased ‘excess’ of LV mass as stratified into quartiles. Potentially, the increase in LV wall stress has been underestimated because of the methods used.

Noteworthy, LV dimensions were increased in patients with ‘excess’ of LV mass. LV pressure, volume, and myocardial mass are crucial determinants of wall stress. LV dilatation implies an increase in radius (of the sphere model of the LV) and, therefore, raises LV wall stress by square. An increased wall stress occurs, if the myocardial growth is not adequate for coping with the expanding ventricular volume.

It appears likely that calculation of CMR-based wall stress would have revealed greater differences. LV wall stress might thus also emerge as a stronger predictor of incident heart failure. In conclusion, we agree with the authors that it is necessary to assess myocardial mass, a vital parameter in heart failure. However, it also appears crucial to monitor an increased wall stress that has various adverse consequences for energy metabolism, gene expression, and arrhythmia risk. In particular, one should be aware of an increase in myocardial wall stress during progression of heart failure.

References

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Radial artery catheterization and radiological exposure

With interest I reviewed the article recently published by Brasselet et al.,1 showing the data of a higher radiation exposure in the invasive procedures performed by radial artery catheterization (RAC), compared with femoral artery catheterization (FAC).

However, owing to a number of possible biases, I think that their results should be generalized with extreme caution.

First, the study was performed in a moderate volume institution. We recently showed that among experienced operators in RAC, those with the highest volumes of procedures achieved the lowest procedural failure rate in the ‘real world’.2 Therefore, despite their expertise in RAC, the operators in this study might not have performed a sufficient RAC volume to yield the best feasibility. This may explain the longer procedure duration and X-ray exposures reported by the authors in contrast to the aforementioned trial performed in a high volume centre.2 The consequence would be that a more frequent use of RAC could imply safer procedures for both patients and operators.

Secondly, radiation exposure may significantly differ in left vs. right RAC. In fact, performing RAC by the left arm has two main...