Dobutamine stress echocardiography: the long and short of it

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Dobutamine stress echocardiography is widely used for the diagnosis\textsuperscript{[4]} and stratification\textsuperscript{[2]} of coronary artery disease and for the detection of hibernating myocardium\textsuperscript{[3]}. An internet search reveals more than 650 publications on the subject over the last 5 years. Recent technical developments such as harmonic imaging\textsuperscript{[4]} and left-sided contrast agents\textsuperscript{[5]} have further increased its applicability. However, there is still the possibility for improvement. It depends on subjectively determined wall motion scores, and discrepancies are still resolved by consensus\textsuperscript{[6]}. The results cannot easily be reduced to graphical form. The end-point itself consists of a reduction in the extent of systolic wall thickening that develops with stress. Experimentally, a reduction in overall systolic amplitude is not the most sensitive manifestation of local ischaemia; subendocardial fibres\textsuperscript{[7]} which support ventricular long axis function are more sensitive to ischaemia\textsuperscript{[8]} than the circumferential ones.
responsible for normal myocardial thickening. There may thus be alternative approaches to detecting the effects of dobutamine stress in patients with coronary artery disease.

The paper in this issue by Mishra et al.[9] supports this contention. Studying left ventricular long axis function by simple M-mode echocardiography, the authors have demonstrated that the normal increase in systolic amplitude occurring with dobutamine administration is attenuated in patients with coronary artery disease. A cutoff value of 0-25 cm gave discrimination for the detection of coronary artery disease at least equal to that of the orthodox wall motion analysis in the same patients. The method appeared particularly promising in patients with single vessel disease. In addition the onset of long axis shortening with respect to the Q wave of the ECG was delayed in those with coronary artery disease.

These results are clearly preliminary. Although statistically significant, the patient group was relatively small. It would, in our opinion, be ethically acceptable to determine the reproducibility of the test as a whole by performing it on two separate occasions in individual patients, rather than simply remeasuring selected records, a process that seems to have been accepted in the literature as an appropriate measure. The present results appear to represent those from a learning set, and will be necessary to determine whether the criteria proposed here can be applied prospectively. Its extension to risk stratification and the detection of myocardial hibernation would seem to be eminently feasible. If confirmed, the method would seem widely applicable. Mitral ring echoes are of high amplitude and can be recorded in the large majority of patients. Use of different sites around the AV ring may allow the effect of induced ischaemia to be localized, although not to the same extent as with standard method. The technical basis, M-mode echocardiography, is simple, widely available but suffers from the widespread perception that in some way it is ‘out of date’. The printed record can be measured directly, thus avoiding the requirement for consensus and establishing clear unities as required by Lord Kelvin’s celebrated criterion ‘to complete science of measurement’[10].

At first sight, it might seem that abnormalities of activation might give rise to problems. Left bundle branch block[11] and even absence of normal septal Q wave[12] cause resting long axis abnormalities. However, changes in QRS duration[13,14] are so common with stress-induced ischaemia as to suggest that they are intimately involved with the overall physiological response. Disturbances of timing can also be recorded, particularly those during early diastole such as post-ejection shortening, which have long been known as very sensitive markers of ischaemia[15]. Indeed, we would foresee a trend whereby stress echocardiography might change from being simply a means of detecting acute ischaemia to a more comprehensive investigation of complex physiological disturbances of amplitude, timing and velocity[16].

Stress long axis echocardiography clearly merits further trial. The method is so simple that it can readily be interpreted into the standard stress echo protocol, particularly in patients with single vessel disease and those with resting wall motion abnormalities. Its objective end-point may well allow it to develop further giving more detailed information about the complex physiological changes that accompany acute ischaemia.

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References


