Current status of stress echocardiography for the diagnosis of myocardial ischemia and viability

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Summary

Stress echocardiography is now accepted as a routine technique for the investigation of coronary disease. The interpretation of stress echocardiograms for clinical purposes is currently performed using qualitative interpretation. Training on the part of the observer is very important from this standpoint. The accuracy of exercise echocardiography for the diagnosis of coronary artery disease is in the range of 85%, and for non exercise stress, it appears to be comparable, although patients who can exercise should do so, because exercise is a more vigorous form of stress than the pharmacological alternatives. Exercise echocardiography is more accurate than the exercise electrocardiogram, particularly in women and in patients with left ventricular hypertrophy. It appears to have a comparable accuracy to myocardial perfusion scintigraphy, being somewhat less sensitive than the latter although more specific. In addition to its diagnostic use stress echocardiography has been found to be useful for prognostic assessment of patients undergoing vascular surgery, patients following myocardial infarction, and those with chronic stable coronary disease. Finally, this technique has found attractive and interesting new uses in the evaluation of patients with possible viable myocardium, and patients with valvular heart disease.

Feasibility

Stress echocardiography has progressed from being a predominantly research technique carried out in a few centers, to being a routine technique for the investigation of coronary artery disease [1-5]. The underlying principle is that ischemic tissue
demonstrates abnormalities in regional left ventricular function which are provoked by stress and correlate closely with the onset of ischemia.

As the technique is currently performed in routine clinical practice, its interpretation is qualitative and therefore subjective. Table 1 summarizes the algorithm which is currently applied for the purposes of this interpretation. Most centers use a segmental left ventricular model in order to standardize this subjective methodology [6], most commonly the 16 segment model recommended by the American Society of Echocardiography, and score the function of each segment before, during and after stress (Figure 1). The stress echocardiography report should therefore include comments on global left ventricular function before and after stress (which may be quantitated if required), regional left ventricular function before and after stress (usually as a wall motion score), the site, extent, onset, duration, and severity of wall motion abnormalities before and after stress, and other cardiac diagnoses including the presence and severity of valvular and pericardial disease.

Fig. 1: Segmentation of the left ventricle for regional wall motion analysis.