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Evaluation viability in patients with ventricular dysfunction by 2D speckle tracking echocardiography: the impact of low dose dobutamine. A meta-analysis of prospective trials

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Topic(s):
Tissue Doppler, Speckle Tracking and Strain Imaging

Citation:
Background: 2D-Speckle tracking echocardiography (2DSTE) has been used for the assessment of myocardial viability in patients with artery disease and left ventricular (LV) dysfunction.

Aim: The purpose of this analysis was to evaluate the diagnostic accuracy of 2DSTE using longitudinal (LS) and rest circumferential strain (CS) in this setting with or without low dose dobutamine (LDD) infusion.

Methods: A systematic review of MEDLINE, Cochrane, and Embase for all the prospective trials using 2DSTE to assess myocardial viability until January 2019 was done. Studies that utilized 2DSTE before coronary revascularisation and used the wall motion evaluation in the long term after the revascularisation as a reference were included. A standard approach of meta-analysis for diagnostic tests and a bivariate analysis of sensitivity, specificity, positive likelihood ratio(+LR), and negative likelihood (-LR) were performed. In addition, direct comparison analysis was done to only studies that compared the tests in the same patients.

Results: A total of 24 studies of 2DSTE evaluating myocardial viability with 1173 patients (mean age 66 years, 72% male, and mean left ventricular ejection fraction was 45%) fulfilled the inclusion criteria. Eight studies used LS, 8 studies used CS, 4 studies used LS with LDD, and 4 studies used CS with LDD. LS and CS with LDD provided higher +LR (4.2 and 4, respectively) as well as a best specificity when compared with LS and CS (81% CI: 65- 92% vs 68% CI: 60- 75%, p=0.04, and 81% CI: 64-91% vs 66% CI: 59-72%, p= 0.02, respectively) for predicting improved segmental LV contractile function after revascularization. The sensitivities of different 2DSTE tests for detection the viability were not statistically different. The direct comparison of the studies with the same patients yielded similar results.

Conclusions: Using LDD with LS and CS analysis significantly improve specificity of the tests. Therefore, the use of a low dose of the dobutamine can be recommended to improve the accuracy of the 2DSTE for detection of viable myocardium following myocardial infarction.
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Figure: Summary ROC Curves
Bivariate summary estimate of sensitivity and specificity for (A) longitudinal strain, and (B) circumferential strain. The solid circle represents the mean of sensitivity and specificity. Each light circle or diamond represents an individual study. The solid curve is the summary receiver-operating characteristic (ROC) curve.