

Strain Relative to Baseline Enhance the Ability to Detect Non-Transmural Myocardial Infarction

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Detection of non-transmural myocardial infarctions (MI) by echocardiography is challenging even for experienced cardiologists. Thus, speckle tracking echocardiography (STE) method was developed to objectively evaluate the regional wall motion. Previous studies showed strong correlations between strain measurements and infarct size, however, the detection of small MI has been challenging.

The hypothesis of this study was that there is a natural heterogeneity of the strain values among the different segments of the normal myocardium. It is important to reveal this heterogeneity when studying the effect of MI on the strain measurements since it may enhance the ability to distinguish between non-transmural MI and non-infarct areas. The aim of the study was to measure this heterogeneity, and to check whether measuring the strain values relative to normal state improves the detection of the non-transmural MI.

In this study 13 rats underwent occlusion of the left anterior descending (LAD) artery for 30 minutes followed by reperfusion. Short-axis scans were obtained before occlusion and at 24 hours following reperfusion. Thereafter, the animal was sacrificed and the LV was stained by Triphenyltetrazolium Chloride (TTC), which defined the MI size. The short-axis scans were post-processed by a STE program, and the peak systolic circumferential (SC) strain was measured. The peak systolic SC and the values relative to baseline measurements were compared to the TTC results.

In the detection of non-transmural MI, peak systolic SC reached a sensitivity of 88% and specificity of 65% for detection of the MI at the apex, however, peak systolic SC relative to baseline enhanced the specificity to 84%.

Strain measurements, relative to normal values, improve the detection of non-transmural MI in regions which demonstrate heterogeneity of values at baseline. These findings may enhance the detection of non-transmural MI by Echocardiography, and may be useful during Stress-Echocardiography.