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Meeting abstract

1080 Strain analysis using magnetic resonance imaging can independently identify affected vessel after acute coronary syndrome

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Background

Regional wall function is an important parameter in the diagnosis of heart disease. Qualitative assessment of wall function has limitations in terms of inter-observer variability. Strain is a new way to obtain quantitative wall function. Magnetic Resonance Imaging (MRI) gives the opportunity to measure strain in both radial and longitudinal directions. We hypothesized that by using only assessment of strain measured acutely after myocardial infarction it is possible to identify which artery was affected.

Methods

In 18 patients who underwent acute PTCA velocity encoded images was obtained on a 1.5 T Philips MR Scanner 2 ± 2 (mean ± SD) days after first time myocardial infarction. Images were acquired in 2CH, 3CH and 4CH projections (TE = 4.9 ms, TR = 7.1 ms, flip angle = 15 degrees, and echo train length 5). Myocardial infarction was defined by ST-elevation on ECG and increased levels of CK-MB and Troponin-T. The myocardium was manually outlined in end-diastole. In house developed software automatically tracked the myocardium throughout the heart cycle and calculated strain in less than 3 seconds. The algorithm is based on solving a non linear partial differential equation. To ensure smoothness, motion was spatially restricted to and described by a third order polynomial. From the displacement, a linear strain tensor was calculated. Myocardial strain was visualized in a polar plot (Figure 1), and one experienced observer visually identified the affected vessel as either LAD, LCx, or RCA.

Results

The experienced observer blinded to patient data correctly identified the affected vessel in all 18 patients compared to angiographic findings. Figure 1 shows three examples of polar plot visualizations of myocardial strain with patients with LAD, LCx, and RCA, respectively.

Conclusion

MRI strain analysis can be used to identify affected vessel after acute myocardial infarction, and is therefore a promising technique to quantify regional wall function.

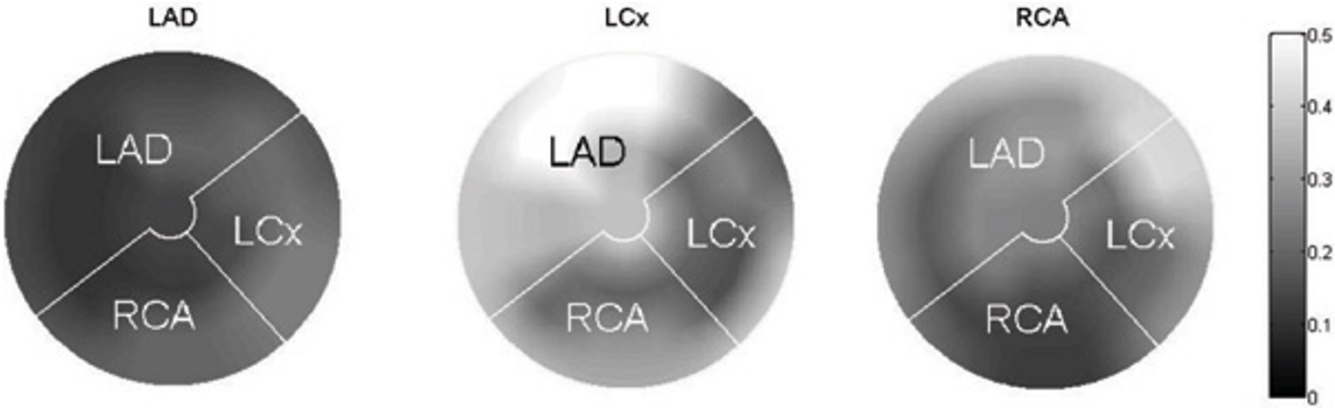

Figure 1
Left panel shows an example of a patient with an LAD infarction. Middle panel shows an example of a patient with an LCx infarction. Right image panel shows an example of a patient with an RCA infarction.