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Meeting abstract

300 Diagnostic value of low b value diffusion weighted MRI in patients with acute myocardial infarction

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Introduction

Diffusion-weighted MRI has been widely employed to detect early ischemic injury of the brain. Diffusion-weighted MRI is potentially useful for detecting AMI.

Purpose

The purposes of this study were to evaluate the feasibility of diffusion weighted MR (DW-MR) Image of the myocardium in patients with acute myocardial infarction (AMI), to determine the optimal b-value to visualize AMI, and to compare DW-MR images with Late gadolinium enhanced MR (LGE-MR) Image.

Methods

Twenty AMI patients were prospectively enrolled. A clinical 1.5 T MR imager was used. The MRI was performed at a mean of 4.7 ± 2.3 days after the onset of AMI.

Free breathing diffusion weighted MR images were acquired with a respiratory and ECG gated single shot echo planar sequence with a number of averages of 5, and b values of 0, 50,100,150,200 and 300 s/mm^2. LGE MR images were obtained 10 minutes after injection of 0.15 mmol/kg of gadolinium contrast medium. In quantitative analysis, the averaged ADC was 4.6 ± 2.2 × 10^{-3} mm^2/s for normal myocardium and 3.6 ± 1.2 × 10^{-3} mm^2/s for infracted myocardium, being substantially higher than the ADC of water at body temperature. However, blood signal was effectively suppressed on low b value diffusion weighted MRI acquired with b value of 50 s/mm^2, permitting visual determination of endocardial border in the dysfunctional segments in patients with AMI.

The observers traced epicardial and endocardial borders of the left ventricular wall, and determined high intensity area on DW-MR image and LGE area on contrast enhanced MRI as a percentage of the total LV area.

Results

1) On low b value DW-MR images, high signal intensity was noted in all of 20 patients in the myocardial segment that corresponded to the myocardial territories perfused by the culprit coronary artery.

2) The ratio of signal intensity of high intensity area to remote normal area on low-b value DW-MRI, which was significantly higher than that of remote normal to another remote normal myocardium (2.87 ± 1.42 vs 0.98 ± 0.07 ($P < 0.0001$)).

3) All infarct lesions detected by low b-value DW-MRI exhibited LGE contrast enhanced MRI.

4) High intensity area on DW-MRI was significantly larger than LGE area on contrast enhanced MRI. 5) Area of infarct-related high intensity on DW-MRI showed significant

linear correlation with LGE area in 20 patients with AMI ($r = 0.825$ ($P < 0.0001$))

Conclusion

AMI can be accurately detected with low b-value DW-MR I. Diffusion sensitive gradients effectively suppressed the confusing bright signal from blood pool in the left ventricular chamber. Imaging approach that combines low b-value DW-MRI and LGE-MRI seems to be promising for the prediction of functional recovery in patients with AMI.