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Meeting abstract

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2019 Diagnostic performance of stress-rest perfusion MRI depends on the cardiovascular magnetic resonance training level

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Introduction

A guideline on training in cardiovascular magnetic resonance (CMR) has recently been compiled by the American College of Cardiology (ACC) Task Force with an endorsement by the Society for Cardiovascular Magnetic Resonance [1]. However, there is no report showing the influence of training level 1, 2 (> 150 cases, 3 months) and 3 (> 300 cases, one year) on the diagnostic performance of stress-rest perfusion MRI.

Purpose

To investigate the influence of training level on the interpretation of stress-rest perfusion MRI.

Methods

Three observers with different levels of CMR training (1, 2 and 3) as defined by the ACC Task Force were enrolled as readers of CMR images in this study. These observers were working at different clinical sites but each institution had a 1.5 T MR system of the same manufacturer presenting a similar imaging capability. A total of 50 CMR studies including stress-rest first-pass perfusion and late gadolinium enhancement were collected from the 3 institutions. MR images were obtained from 50 patients (36 men and 14 women; mean age, 65.4 years; age range, 41–83 years) with suspected coronary artery disease. In addition to MRI, x-ray coronary angiography was also performed in all the patients. Saturation-recovery prepared steady-state free precession sequence was used for perfusion MRI. Late enhancement images were acquired by using an inversion-recovery prepared fast gradient-echo sequence. The three observers independently evaluated the presence or absence of abnormal enhancement on perfusion MRI and late enhancement MRI, respectively, with a scale of 1 to 5: 1 = definitely normal, 2 = probably normal, 3 = possibly abnormal, 4 = probably abnormal, 5 = definitely abnormal.

Results

Sensitivity and specificity of perfusion MRI for detecting patients with flow-limiting luminal narrowing (> = 50%) on x-ray coronary angiography was 88.9%(32/36) and 35.7%(5/14) by the level 1, 83.3%(30/36) and 71.4%(10/14) by the level 2, and 88.9%(32/36) and 78.6%(11/14) by the level 3 observer with area under the receiver operating characteristics curve of 0.800 for the level 1, 0.842 for the level 2, and 0.915 for the level 3 observer, respectively. Cohen's Kappa statistics showed poor to moderate interobserver agreements on a binary assessment of presence or absence of ischemia in a patient based analysis (Kappa value = 0.220 between the level 1 observer and the level 2 observer, 0.140 between 1 and 3, 0.486 between 2 and 3, respectively). In contrast, interobserver agreements on a binary assessment of presence or absence of late gadolinium enhancement at the patient level were substantial (Kappa value = 0.768 between the

level 1 observer and the level 2 observer, 0.718 between 1 and 3, and 0.744 between 2 and 3, respectively).

Conclusion

Good interobserver agreements were observed in the interpretation of late enhancement MRI regardless of the different levels of CMR training of the observers. On the other hand, the lower diagnostic performance shown by the level 1 observer, especially the limited specificity, suggests that level 2 or higher CMR training is needed to be qualified for an interpreter of stress-rest perfusion MRI.

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