Poster presentation

Adenosine-stress magnetic resonance perfusion for detection of coronary artery stenosis at 3 T is not inferior to 1.5 T

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Introduction
Adenosine-stress magnetic resonance imaging (CMR) at 1.5 T has established for diagnosis of inducible myocardial ischemia in patients with suspected coronary artery disease (CAD). However, little is known about feasibility and accuracy of stress-perfusion performed at 3 T.

Purpose
Aim of our study was to compare 1.5 T and 3 T stress perfusion for diagnosis of inducible myocardial ischemia representative for coronary artery stenosis in patients with suspected coronary artery disease.

Methods
Patients with clinical indication for coronary x-ray angiography underwent previously adenosine-stress CMR at 1.5 T (Intera, Philips Medical Systems) and 3 T (Achieva, Philips Medical Systems) within 48 hours. Within 72 hours after the last CMR examination coronary angiography was performed in these patients. A SSFP-based sequence was used for perfusion imaging at 1.5 T and a gradient-echo sequence at 3 T. Three short axis distributed along the left ventricle were acquired, consequently after three minutes of adenosine infusion at a constant rate (140 µg/kg/min) to visualize myocardial first-pass of 0.075 mmol/kg Gadolinium-based contrast agent (Dotarem, Guerbet). Ten minutes later the same perfusion sequence using a second contrast bolus was performed during rest. All CMR images were analyzed by two blinded and experienced readers in consensus for presence of hypoperfusion during stress perfusion. Perfusion sequences were evaluated using the 17-segment-model. A relevant stenosis was defined by QCA as luminal reduction ≥70% in a vessel with ≥2 mm diameter.

Results
123 perfusion territories of LAD, RCX and RCA were analyzed. 11 territories were excluded due to poor image quality in one of the examination at either magnetic field strength. In 45 coronary arteries stenoses ≥70% were found by coronary x-ray angiography. 1.5 T CMR stress perfusion yielded a sensitivity of 0.89, a specificity of 0.93 and an overall accuracy of 0.91 for the diagnosis of coronary artery stenosis. Sensitivity of 3 T CMR stress perfusion was 0.91, sensitivity 0.90 and overall accuracy 0.90.

Conclusion
Adenosine-stress CMR perfusion using a gradient-echo sequence at 3 T is feasible for diagnosis of coronary artery stenosis and is not inferior to the established 1.5 T CMR stress perfusion. Further studies are warranted to evaluate whether 3 T stress perfusion could be also used for quantitative perfusion analysis and may even be superior to 1.5 T examination.