Diagnostic Performance of Whole-Body 3D MR Angiography in Patients with Peripheral Arterial Occlusive Disease

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Synopsis:

The purpose of our study was to assess whole-body 3D MRA using AngioSURF in comparison to DSA for the peripheral vasculature and for the detection of additional atherosclerotic lesions in patients with PAD. 52 patients with angiographically documented PAD underwent contrast-enhanced (Gadovist®, Schering, Germany) whole-body MRA on a 1.5T MR-Scanner. Overall sensitivity and specificity were 0.91 and 0.94, respectively, for the detection of vascular pathologies. Unsuspected disease was found in 12 patients: renal artery stenosis (6), carotid arterial stenosis (3), subclavian artery stenosis (1), and AAA (2). Whole-body 3D MRA permits a fast, reliable, and comprehensive evaluation of the arterial system in patients with PAD.

Introduction:

Patients with peripheral arterial disease (PAD) frequently suffer from additional atherosclerotic lesions of the coronary, renal, and carotid arteries (1). Hence, the concomitant assessment of the entire arterial system from supraaortic arteries to the distal runoff vessels in a single exam appears desirable for this patient population. Based on bolus-chase techniques and fast gradient systems rapid whole-body MR angiography (WB-MRA) has become clinically available (1,2). The purpose of this work was to assess the diagnostic value of WB-MRA compared to conventional DSA exams in patients suffering from PAD.

Methods:

52 consecutive patients (36 m, 16 f; age range: 54 and 78 years; mean age: 61.2 years) with known PAD referred for DSA of the lower extremities were enrolled in the study. WB-MRA was performed on a 1.5 T MR-Scanner (SIEMENS, Sonata, Erlangen, Germany) using the AngioSURF-system. Following the automated injection of 0.2 mmol/kg BW gadobutrol (Gadovist®, Schering, Berlin, Germany) five overlapping stations were acquired with a 3D T1-w GRE sequence within a total scan time of 72 s. Conventional digital subtraction angiography (DSA) was available as reference standard for the peripheral vasculature in all patients. Sensitivities and specificities for the detection of significant stenoses (luminal narrowing > 50%) were calculated for all vessel segments with DSA correlation. Data analysis was performed in a blinded fashion by two experienced vascular radiologists. Additional vascular disease detected by WB-MRA was subsequently assessed with ultrasound and/or a dedicated MRA exam.

Results:

All WB-MRA exams were feasible and well tolerated by the study participants. With DSA as gold standard, WB-MRA reached an overall sensitivity of 0.91 and specificity of 0.94 for the detection of high-grade stenoses. Additional vascular disease was detected in 12 patients (renal artery stenosis, n=6; carotid artery stenosis, n=3 (Fig.1); subclavian artery stenosis, n=1; vertebral artery occlusion, n=1; AAA, n=2).

Conclusion:

The outlined WB-MRA approach permits a rapid, non-invasive, and accurate evaluation of the arterial system from carotid to tibial arteries in patients with PAD. It offers the potential to detect additional relevant and clinically non-suspected vascular disease.

References:

1. AHA 2002 Heart and Stroke Statistical Update