

Meeting abstract

Open Access

102 Diagnostic value of contrast-enhanced whole-heart coronary MRA at 3 Tesla

Qi Yang*¹, Debiao Li², Xiaoming Bi³, Jing An⁴, Qiang Zhang⁴, Renate Jerecic³ and Kuncheng Li¹

Address: ¹Department of Radiology, Xuanwu Hospital, Capital Medical University, Beijing, PR China, ²Department of Radiology, Northwestern University, Chicago, IL, USA, ³Siemens Medical Solutions, Chicago, IL, USA and ⁴Siemens Mindit Magnetic Resonance Ltd, Shenzhen, PR China

* Corresponding author

from 11th Annual SCMR Scientific Sessions
Los Angeles, CA, USA. 1–3 February 2008

Published: 22 October 2008

Journal of Cardiovascular Magnetic Resonance 2008, **10**(Suppl 1):A3 doi:10.1186/1532-429X-10-S1-A3

This abstract is available from: <http://jcmr-online.com/content/10/S1/A3>

© 2008 Yang et al; licensee BioMed Central Ltd.

Introduction

With the increased availability of clinical 3 T MR scanners, high expectations are set for coronary MR imaging in terms of scan time, resolution and image quality. The feasibility of performing contrast-enhanced whole-heart coronary MRA at 3 T has been demonstrated recently [1]. High signal-to-noise ratio, contrast-to-noise ratio, and good image quality were consistently achieved on volunteers with 3D inversion-recovery-prepared FLASH and slow infusion of high-relaxivity clinical contrast agent. No clinical results using this technique at 3 T were available so far. The purpose of this study was to evaluate the clinical robustness and diagnostic accuracy of whole heart coronary MRA at 3 T in comparison to X-ray coronary angiography.

Purpose

To evaluate the diagnostic accuracy of contrast-enhanced whole-heart coronary MRA at 3 T in patients with suspected coronary artery disease.

Methods

Twenty-two patients (64 ± 10.2 years) with suspected coronary artery disease underwent cardiac MR examination at 3 T (MAGNETOM Tim Trio, Siemens, Germany) after informed consent was obtained. Coronary arteries were imaged using an ECG-triggered, navigator-gated, inversion-recovery, segmented gradient-echo sequence with isotropic whole-heart coverage. A twelve-element matrix

coil (six anterior and six posterior) was used for data acquisition. To speed up data acquisition, parallel acquisition (GRAPPA) was used in the phase-encoding direction with an acceleration factor of two. Imaging parameters included: voxel size $0.65 \times 0.65 \times 0.65$ mm³ (interpolated from $1.3 \times 1.3 \times 1.3$ mm³), TR/TE = 3.3/1.5 msec, flip angle = 20°, bandwidth = 700 Hz/pixel, imaging time = 8.8 ± 1.9 min. Contrast agent (0.2 mmol/kg body weight, Multihance, Bracco Imaging SpA, Italy) was intravenously administered at the rate of 0.3 ml/sec using a Medrad power injector. All patients received x-ray angiography (CAG) within 1 week after coronary MRA. The CMRA and CAG data were blinded and reviewed on a segment basis by two radiologists. The accuracy of 3 T coronary MRA in detecting coronary stenosis on segment basis was evaluated using X-ray angiography as the reference.

Table 1: Whole heart coronary MRA using a slow infusion 3D IR-Flash technique at 3 T was performed in 22 patients with suspected coronary artery disease and compared to x-ray coronary angiography.

		CAG	
		>50% stenosis	<50% stenosis
MRA	>50% stenosis	23	5
	<50% stenosis	4	154

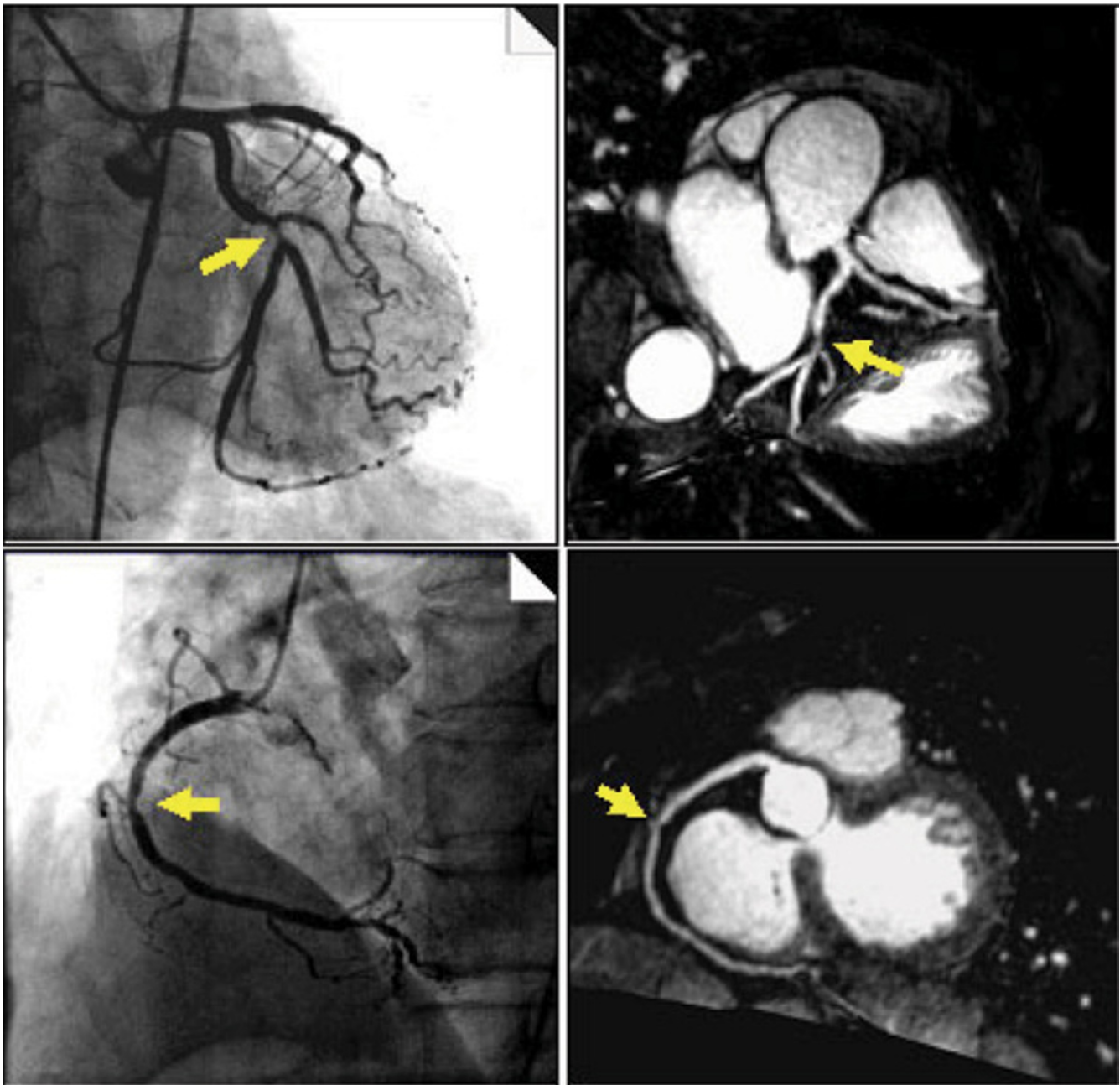


Figure 1
Diagnostic accuracy of whole heart coronary MRA.

Results

There are 186 assessable segments, and 12 segments could not be analyzed by coronary MRA. 23 segments with significant stenosis (>50%) were correctly diagnosed by MR. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of coronary MRA on a segment basis were 85.2%, 96.9%, 82.1%, 97.5%, and 95.2%, respectively. Figure 1 and Table 1 show reformatted coronary MRA images and reference X-ray angiogra-

phy from a 75-year-old patient. The stenosis in both left and right coronary arteries are well depicted (arrows).

Conclusion

3 T whole-heart contrast-enhanced coronary MRA showed good diagnostic accuracy for detection of significant stenosis. The results of the study in sensitivity, specificity, PPV and NPV fall into the lower range of reported values from recent CT literature [2]. These results justify optimism that

further improvements in spatial resolution and imaging speed may lead to clinically acceptable coronary MRA examinations [3].

References

1. Bi X, Carr J, Li D: *MRM* 2007, **58**(1):1-7.
2. Achenbach S: *JACC* 2006, **48**:1919-1928.
3. Stuber M, Weiss RG: *JMRI* 2007, **26**:219-234.

Publish with **BioMed Central** and every scientist can read your work free of charge

"BioMed Central will be the most significant development for disseminating the results of biomedical research in our lifetime."

Sir Paul Nurse, Cancer Research UK

Your research papers will be:

- available free of charge to the entire biomedical community
- peer reviewed and published immediately upon acceptance
- cited in PubMed and archived on PubMed Central
- yours — you keep the copyright

Submit your manuscript here:
http://www.biomedcentral.com/info/publishing_adv.asp

