Artifact-free visualization of the coronary vessel wall in the presence of a new coronary MRI stent

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Abstract

The aim of this study was the investigation of a new dedicated coronary MRI stent for artifact-free visualization of the coronary vessel wall. Dual inversion recovery black-blood turbo spin echo vessel wall imaging was performed in 15 healthy swine perpendicular to the main axis of the coronary arteries at the level of the stent. Images were analyzed by two investigators in terms of visible artifacts. In all cases, coronary vessel wall could be completely artifact free visualized. In conclusion, the new coronary MRI stent allows for artifact-free visualization of the coronary vessel wall.

Introduction

Metallic stents are frequently used for treatment of coroanry artery stenoses. However, in-stent lumen can not be assessed by coronary magnetic resonance angiography due to susceptibility artifacts and RF-shielding resulting in a siganl void. Recently, a new fully MR compatible alloy was developed allowing for artifact-free contrast-enhanced renal MRA (1). The aim of this study was the investigation of three prototype *coronary* MRI stents for artifact-free *coronary vessel wall* imaging. Vessel wall imaging in the stented vessel segment may be helpful for visualization of in-stent re-stenosis and associated inflammation of the vessel wall after stent placement.

Materials and Methods

The new coronary MRI stent (Aachen Resonance, Aachen, Germany) is made from of dedicated alloy to minimize susceptibility artifacts and RF shielding (1). Three newly developed coronary prototype stents (hand-woven (n=9), mechanically woven (n=3) and lasered (n=3, suitable for dilatation from 2.5-4mm) were implemented in both coronary arteries of 15 healthy swine (RCA:n=3, LCX:n=2, LAD:n=10) and investigated on a 1.5T ACS-NT MR-scanner (Philips, Best, NL). A previously described 2D dual inversion black-blood turbo spin echo coronary vessel wall imaging sequence (2) was used. Sequence parameter included TR=2 heart beats, TE=25ms, echo train length 7, echo spacing 6.2ms, 0.6x0.6mm in-plane resolution, reconstructed to 0.312x0.312mm. Artifacts of the stented vessel segment and proximally and distally to the stent were visually assessed by two investigators by consensus (no artifacts or minor/major artifacts). Stent localization was proven by cardiac multislice CT.

Results

In all cases, coronary vessel wall was artifact-free visualized in the stented vessel segment as well as proximally and distally to the stent.

Conclusion

The new coronary MRI stent allows for completely artifact-free coronary vessel wall imaging.

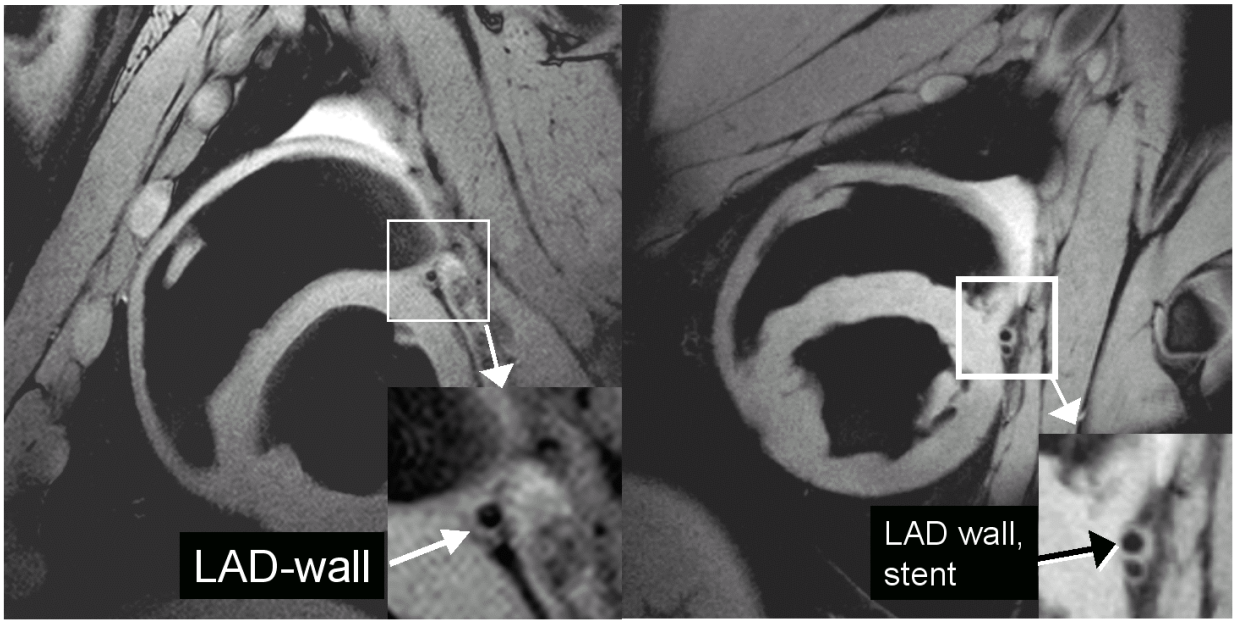

Figure 1: Vessel wall imaging as used in this study without stent (left) and in the presence of the new coronary MRI stent (right). Vessel wall is artifact-free visualized in the stented vessel segment.

Ref.

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2. Botnar RM, Stuber M, Kissinger KV, Kim WY, Spuentrup E, Manning WJ. Noninvasive coronary vessel wall and plaque imaging with magnetic resonance imaging. Circulation 2000;102:2582-2587