

Meeting abstract

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132 Coronary vessel wall evaluation by MRI in the Multi-Ethnic Study of Atherosclerosis (MESA): physiologic determinants of image quality

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Introduction

Coronary artery wall magnetic resonance imaging (MRI) has been developed to assess coronary lumen diameter and wall thickness.

Purpose

The purpose of this study was to evaluate physiologic parameters that affect measures of coronary wall thickness using black blood MRI pulse sequences.

Methods

87 participants (M: 38, F: 49) of the Multi-Ethnic Study of Atherosclerosis (MESA) were enrolled in the coronary artery wall MRI study. Cine four chamber imaging was used to determine the coronary artery rest period. Free breathing whole heart magnetic resonance angiography (MRA) with motion adaptor navigator was performed to localize the coronary arteries. Cross-sectional free breathing black-blood images were acquired using ECG-gated, turbo spin echo (TSE) sequence. Six images were acquired from left anterior descending artery (LAD) and right coronary artery (RCA) and one image was planned on the left main (LM) artery (Figure 1). Imaging parameters were TR = 2 R-R intervals, TE = 33 ms, echo train length = 13, bandwidth = 305 Hz/pixel, matrix = 416 × 416, field of view = 420 × 420 mm and slice thickness = 4–5 mm.

Results

Imaging was completed in 215/234 (92%) coronary segments; 9 participants had incomplete scans. Mean age was 62.6 ± 8.4 years (45–81 years). Mean body mass index (BMI) was 29.2 ± 5.9 kg/m². A higher proportion of images with quality of "good" was seen in the RCA (40.5%) compared to the LM and LAD (31.9% and 26.4%, respectively). There was very good agreement between observers in the image quality scores (kappa = 0.79, P < 0.001). Lower heart rate, male gender and longer coronary rest period were associated with higher image quality score (p < 0.05). SNR was higher in participants with Agatston calcium score of more than 10 in the RCA and LM arteries (48.5 vs. 69.7, p = 0.001 & 53.4 vs. 61.6, p = 0.032).

Conclusion

Improved depiction of the coronary artery wall with MRI is related to coronary rest period and atherosclerotic plaque burden as measured by calcium score and inversely related to heart rate. Since longer coronary artery rest periods are associated with improved image quality both for angiography with MRI and coronary artery wall imaging, heart rate lowering methods in association with these techniques appear to be a logical application.

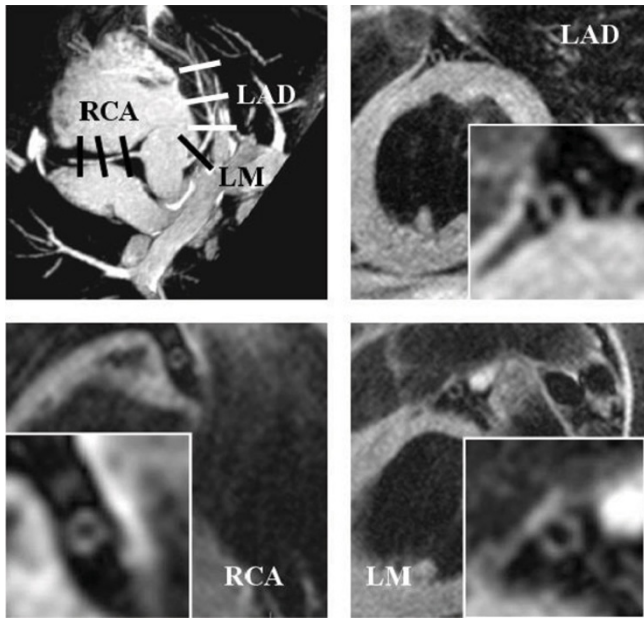


Figure 1

Purpose of this study was to evaluate the role of physiologic parameters in coronary vessel wall imaging. Improved depiction of the coronary artery wall is related to coronary rest period, atherosclerotic plaque burden and inversely related to heart rate.

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