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Meeting abstract

2141 A novel approach for screening atherosclerosis in diabetes: MRI of the superficial femoral artery

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Introduction

Peripheral arterial disease (PAD) has a high prevalence (29%) in asymptomatic patients with diabetes mellitus (DM) with a significantly increased risk of cardiovascular events and morbidity. Current screening methods are inadequate. The superficial femoral artery (SFA) may be a relatively accessible target for screening of atherosclerosis. Cardiovascular magnetic resonance (CMR) allows direct visualization of atherosclerotic plaque burden noninvasively. We sought to establish the prevalence of peripheral atherosclerosis in a cohort of asymptomatic patients with diabetes and coronary artery disease by CMR of the SFA.

Methods

We studied 18 subjects with DM and CAD and no symptoms, manifestations, or history of PAD with 10 age-matched controls without DM or known vascular disease. We collected extensive clinical information and performed ankle-brachial index (ABI) measurements. Patients with positive ABIs were excluded. CMR imaging of both lower extremities was performed utilizing a linear 4-element surface coil array on a 1.5 Tesla Siemens Avanto scanner to create contiguous, interleaved 6 mm axial black blood, T1-weighted, fat-suppressed, spin-echo images of the SFA with a resolution of 0.5 × 0.5 × 3.0 mm. Analysis originated at the bifurcation of the SFA using VesselMass software and included determination of mean wall thickness (WT) and total wall volume indexed to total vessel volume (IWV) to adjust for patient size and vessel length.

Results

The cohort had similar age and gender compared with the controls (age ± standard deviation (SD) 63.9 ± 8.6 vs. 63.2 ± 9.3, p = 0.66, and gender 82%M versus 80%M, p = 0.88). Subjects had a duration of DM of 11 ± 8.9 years, with HgbA1c 7.6 ± 1.5 with 88% oral agent and 24% insulin use. There were 35.3% with prior PCI and 35.3% had prior coronary bypass surgery. Mean ± SD LDL was 73 ± 21 mg/dL, HDL 43 ± 12 mg/dL, and microalbumin 2.8 ± 6.8 mg. Compared to the controls, the DM-CAD cohort had a higher BMI (30.1 ± 2.9 vs. 24.6 ± 2.6; p < 0.001), more hypertension (94% vs. 20%, p < 0.001), tobacco use (53% vs. 30%, p < 0.001), and statin therapy (94% vs. 60%, p < 0.001). Thirty-five vessels were analyzed for the 18 subjects, 20 for the 10 controls. The length of SFA imaged was similar between the groups (16.5 ± 2.7 cm vs. 15.8 ± 2.9 cm, p = 0.42). Subjects with DM and CAD (Figure 1B) had greater WT (1.53 ± 0.29 mm vs. 1.18 ± 0.26 mm, p = 0.016) and higher IWV (52.0 ± 1.2% vs. 45.8 ± 7.0%, p < 0.001) than controls (Figure 1A).

Conclusion

The prevalence of atherosclerotic plaque burden in the SFA of patients with DM and CAD, as measured by wall thickness and volume by CMR, is significantly higher than age and gender-matched controls. This finding in the setting of normal ABIs indicates the potential utility of this noninvasive testing to facilitate earlier intervention and prevention of disease complications. Our analysis also

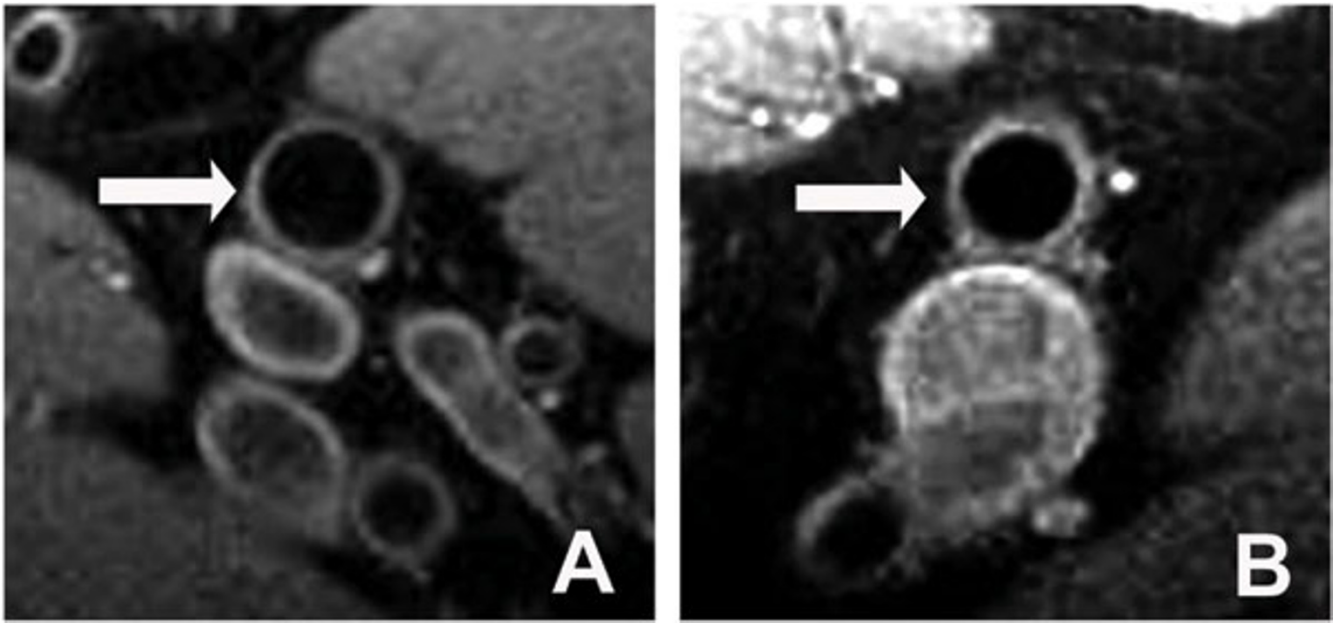

Figure 1

suggests that CMR imaging of the SFA in diabetics may be useful for the monitoring of disease regression with lipid lowering or other novel therapies in clinical trials. Further studies with larger patient numbers are warranted, including comparison to presently used screening tools such as carotid-intimal thickening.