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Meeting abstract

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2029 Systemic sclerosis: detection of myocardial fibrosis by contrast-enhanced MRI

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Introduction

Systemic sclerosis (SSc) represents a complex disorder of obscure etiology which affects the skin as well as various organs. Cardiac manifestations of SSc may result in pericardial disease, valvular disease, conduction system abnormalities, and arrhythmias; however, myocardial fibrosis is the hallmark with major impact on treatment and patients' prognosis.

Purpose

Thus, our study aimed to assess the potential of contrast enhanced cardiac MRI for early detection of cardiac involvement in patients with systemic sclerosis.

Methods

Our study included 35 patients (31 female, 4 male; mean age, 54 ± 14 years) with known systemic sclerosis and an age, sex and cardiovascular risk factors matched control group. Patients with known coronary artery disease (CAD) or a history of myocardial infarction were excluded from the study. All examinations were performed on a 1.5 T MR scanner (Magnetom Avanto, Siemens, Germany). The MRI protocol included Steady-State Free Precession cine sequences (TrueFISP, TR 3 ms, TE 1.5 ms, FA 60°) in long and short axis views for the assessment of myocardial function. Fat-suppressed T2-weighted turbo spin echo images (TR 2 heart beats, TE 49 ms, FA 180°) in standard orientations were acquired for the assessment of myocardial edema. Additionally, an inversion-recovery fast low angle shot sequence (turboFLASH, TR 8 ms, TE 4 ms, TI 180–240 ms, FA 20°) was applied in short and long axis views 10–15 min after injection of a 0.2 mmol/kg BW of Gd-DTPA (Magnevist™, Schering AG, Berlin, Germany).

Results

Diagnostic image quality could be achieved in all but one patient. MRI detected cardiac abnormalities in 50% of our patients and in 24% of our control group. A reduced ejection fraction (< 55%) was observed in 7 (21%) SSc patients, whereas no individual of the control group showed a reduced ejection fraction ($p < 0.05$). Pericardial effusion was observed in 6 (18%) SSc patients and in 1 (3%) control ($p > 0.05$). Ten (26%) SSc patients and 3 (12%) controls showed valve pathologies ($p > 0.05$). Neither a SSc patient nor a control showed myocardial edema on T2-w images. Late enhancement of a non-ischemic pattern and not corresponding to a coronary territory was detected in 5 (15%) SSc patients. In all instances, areas of poorly defined, patchy late enhancement (Figure 1a) and areas of well defined focal (Figure 1b) were detected in the mid-myocardial layer. Focal late enhancement was observed in the mid-myocardial layer of one control (3%, $p > 0.05$).

Conclusion

The concept of myocardial late enhancement has been established for the assessment of myocardial viability. In chronic myocardial infarction, the accumulation of gado-

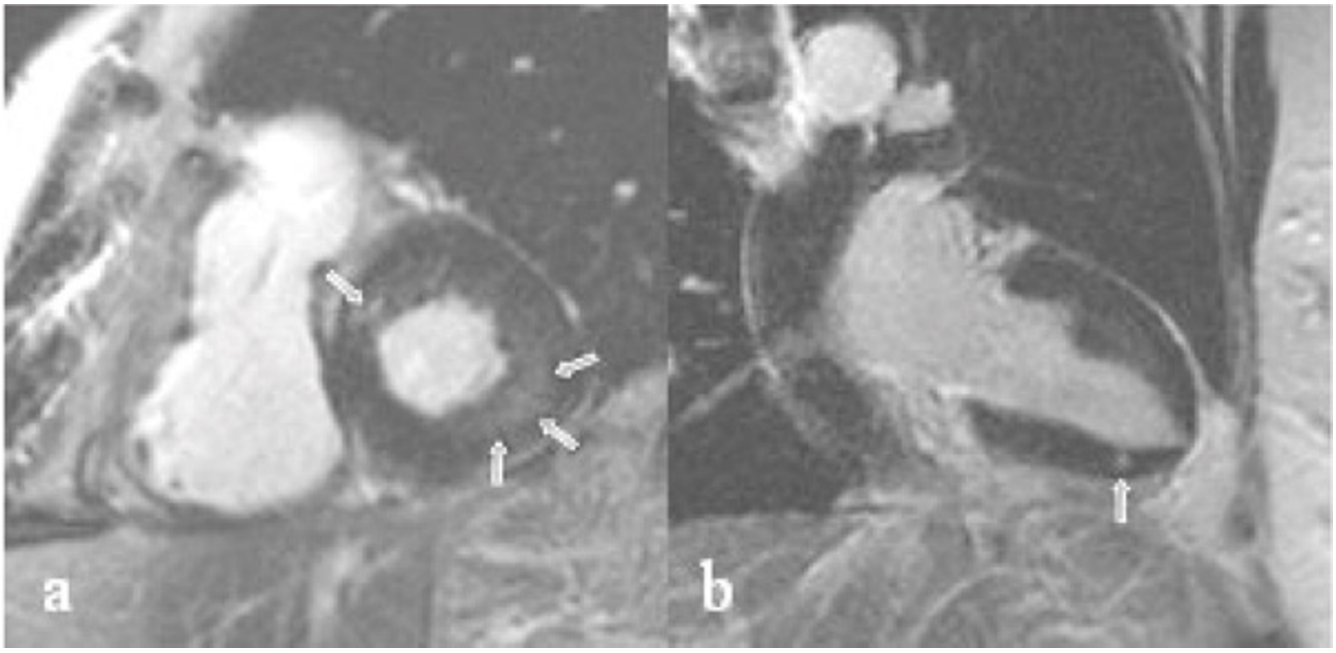

Figure 1

linium-based contrast material reflects irreversible damage and scar formation. However, whereas LE is highly sensitive in characterizing myocardial scarring, it is not specific for ischemic damage since contrast agents generally accumulate in tissues with an increased interstitial space or areas with cell membrane damage. Thus, LE also occurs in myocardial areas of inflammation, edema, as well as fibrosis (Hunold, AJR 2005). Contrast-enhanced MRI must be considered as the imaging modality of choice for the detection of myocardial fibrosis in vivo. Our data show that late enhancement can be detected in 15% of SSc patients with no clinical evidence of myocardial involvement. Therefore, contrast-enhanced MRI seems to be well suited for screening of myocardial fibrosis, monitoring the progression and possibly evaluating therapeutic effects. However, long-term follow-up studies are mandatory to investigate the impact of late enhancement on patients' prognosis.