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Meeting abstract

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2070 Mitral valve prolapse is associated with abnormal CMR late gadolinium enhancement of the mitral valve leaflets and the papillary muscles

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Introduction

Perivalvular ventricular and papillary muscle fibrosis has been well described in pathologic studies of mitral valve prolapse (MVP) patients, but has not been reported by non-invasive imaging. We applied 2D and high resolution 3D late gadolinium enhancement (LGE) cardiovascular magnetic resonance (CMR) in 14 MVP patients with myxomatous mitral leaflets and 4 control patients.

Methods

CMR was performed using a commercial Philips 1.5 T MR whole body scanner (Intera Achieva, Philips Medical Systems, Best, Netherlands) equipped with a 5-element cardiac synergy coil. 15 minutes following IV administration of 0.2 mmol/kg gadolinium-DTPA, 2D LGE-CMR was performed in the short axis and long axis orientation as previously described. Scan parameters: TR 4.3 ms, TE 2.1 ms, flip angle 15°, FOV 320 mm, matrix 160 × 160, spatial resolution 2 × 2 × 8 mm3 reconstructed to 1.2 × 1.2 × 8 mm3 using zero-padding. At 20 minutes post injection, a ECG-gated free breathing, respiratory navigator gated 3D LGE-MRI scan were obtained during free-breathing as previously described. TR 4.3 ms, TE 2.1 ms, flip angle 15°, FOV: 320 mm, full echo, matrix 224 × 224 × 23–32 partition-encoded lines, spatial resolution 1.3 × 1.3 × 5 mm3 reconstructed to 0.6 × 0.6 × 2.5 mm3. For both 2D and 3D LGE-MRI scans, fat saturation was applied and inversion times were determined using the Look-Locker sequence. Arrhythmia monitoring by a Holter or an event monitor in the last five years were available in 11 patients. Complex ventricular arrhythmia (CVA) is defined by the presence of monomorphic couplets or non-sustained ventricular tachycardia. Absence of CVA was determined by a negative Holter or event monitor, or no symptoms and no records of CVA in the last five years.

Results

We identified focal regions of late gadolinium enhancement in the papillary muscles suggestive of fibrosis in 9 (64%) of MVP patients with higher resolution 3D LGE-CMR, 4 of which had LGE on 2D LGE-CMR and none in the control patients. Thirteen of 14 MVP patients had valvular LGE 3D LGE-CMR. Figure 1 shows an example with corresponding steady state free processing (SSFP), 2D LGE-CMR, and 3D LGE-CMR images demonstrating enhancement in the mitral leaflets (B, C) and papillary muscles (E, F). Eight of the 9 patients with papillary muscle LGE had high grade CVA while the 5 patients who did not have LGE had no CVA ($p = 0.003$).

Conclusion

In the MVP population, LGE of papillary muscles identified by higher resolution 3D LGE-CMR methods is associated with complex ventricular arrhythmia. Extensive LGE of the mitral leaflets is present in the majority of patients with myxomatous mitral valves.

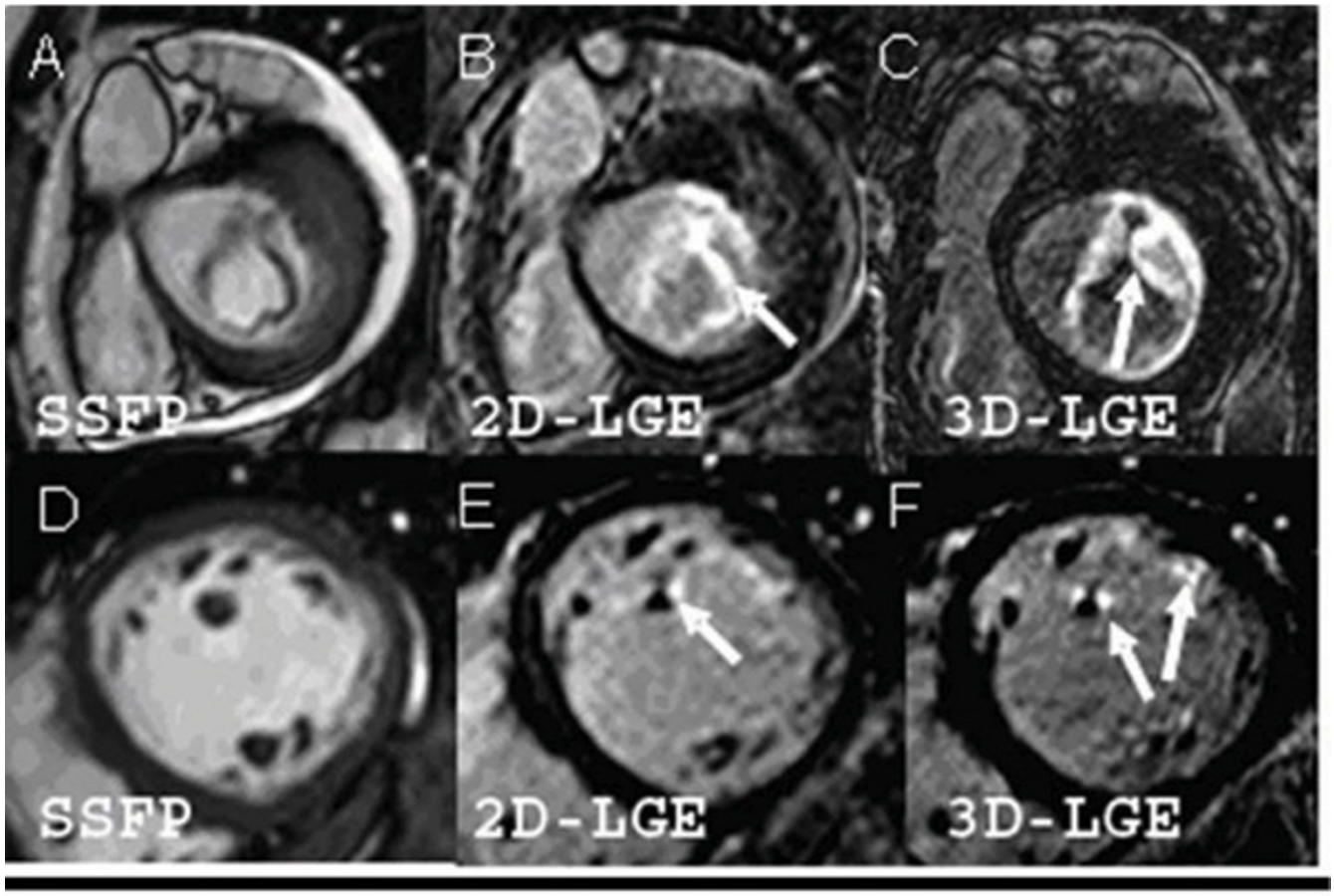

Figure 1
LGE-CMR at the mitral leaflet and papillary muscle level in an MVP patient. **A** and **D**, cine SSFP images. **B** and **E**, 2D LGE-CMR. **C** and **F**, higher resolution 3D LGE-CMR. Arrows indicate the LGE regions.