

Poster presentation

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Quantitative assessment of atrioventricular plane displacement in normal and diastolic heart failure-a cine MRI study

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Introduction

Left atrioventricular plane displacement reflects the dysfunction in patients with heart failure. In previous studies, it has been reported that the displacement was decreased with progression of diastolic dysfunction [1,2]. The purpose of our study is to use conventional cine magnetic resonance imaging to measure the displacement of the atrioventricular plane of the left ventricle in normal subjects and in patients with diastolic dysfunction.

Purpose

To assess the change in position of the AVJ plane by noninvasive, conventional cine MRI to diagnose early diastolic dysfunction.

Methods

Cine MRI was performed at 1.5 T MRI scanner (Symphony, Siemens) on eight normal volunteers (NI) (29 ± 4.4 years old) and eight patients with heart failure (64 ± 17 years old) in two-, three- and four-chamber long axis views. Five patients had a history of mild cardiomyopathy with normal wall thickness (NT), and three patients had left ventricular hypertrophy (H). All patients had normal or near normal ejection fraction ($\geq 45\%$). Analysis used software custom written in Matlab (Natick, MA). To measure the displacement of the atrio-ventricular plane, a reference line was drawn from the ventricular apex towards the base of the left ventricle (green line in Figure 1(a)). The position of the atrioventricular junction (AVJ) was tracked

during the cardiac cycle (red dot in Figure 1(a)) and was projected onto the reference line. The displacement of the AVJ along the reference line was measured relative to the position at end-diastole. Two parameters were selected for the analysis: (1) Maximum displacement (mm) of the AVJ towards apex and (2) Thm (ms), the time period between the half maximum systolic and half maximum diastolic displacement points.

Results

Results are shown in Figure 1: (b) the time courses of the 2-chamber AVJ displacement are shown for the representative NI, NT and H during the cardiac cycle, (c) box plots of the 2-chamber maximum displacements (mean; -17.9,-14,-11.1; NI, NT, H; respectively), and (d) box plots of the 2-chamber Thm (mean; 317.4, 552.1, 756.6; NI, NT, H; respectively). The AVJ displacement is decreased in NT and H as compared to NI.

Conclusion

Cine MRI measurement of the AVJ displacement provides a simple and potentially valuable noninvasive method to assess early left ventricular diastolic dysfunction. This method can be used on any conventional MRI system.

References

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2. Willenheimer R, et al: *European Heart Journal* 1999, **20**:612-618.

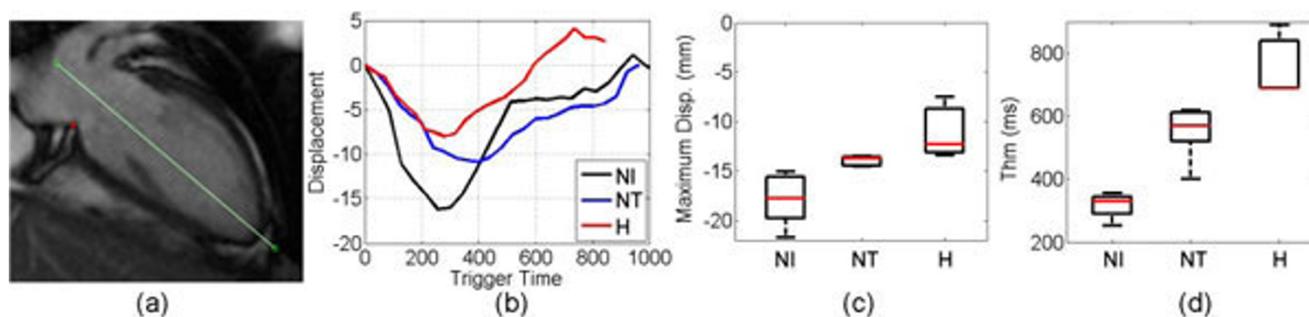


Figure 1