

Poster presentation

Assessment of diastolic heart failure by 3D velocity-encoded MR Imaging with retrospective valve tracking

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Introduction

Diastolic heart failure can be clearly diagnosed by invasive angiography, but up to now the accuracy of noninvasive assessment is limited.

Purpose

Three dimensional three directional velocity-encoded MR Imaging is a new method for the exact flow quantification both for semilunar and atrio-ventricular valves. The aim of this study was, to demonstrate the capability of this method for the assessment of diastolic heart failure.

Methods

Up to now, 3 patients with diastolic heart failure and 5 healthy volunteers underwent three-dimensional three-directional velocity-encoded magnetic resonance imaging on a 1.5 T scanner. From a 3D acquisition volume covering the area of the atrio-ventricular valves, 2D images of the mitral valvular plane were retrospectively manually reconstructed over the complete heart cycle using software developed in house. After motion correction of the valvular plane, the through-plane velocity vectors of the valve area were calculated from the three original flow vectors. For comparison, a cardiac ultrasound including the velocity pattern of the mitral valve inflow was recorded.

Results

In patients with diastolic heart failure, the derived flow curves clearly depict the typical flow pattern with an increased late diastolic flow (see figure below for repre-

sentative images). The quotient between early and late flow (flowE/flowA) of 1.0 ± 0.2 was significantly higher than in healthy subjects (3.6 ± 0.6 , $p = 0.002$). When compared with cardiac ultrasound, flowE/flowA in MRI correlated well with the ultrasound parameters E/A (1.1 ± 0.3) and E/E' (13.6 ± 3.4) ($r = 0.99$ and $r = 0.96$, respectively).

Conclusion

This pilot study demonstrates the feasibility of the assessment of diastolic heart failure by three dimensional velocity encoded MR Imaging. Nevertheless, its value in comparison with established test has to be assessed on a larger patient population.

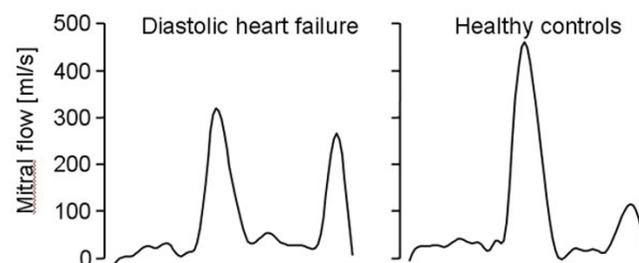


Figure 1
Representative flow curves over the mitral valve.