

Chronic beta-blockade improves longitudinal left ventricular function in patients with chronic heart failure: a cardiac magnetic resonance study

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There is currently an increasing interest in left ventricular (LV) longitudinal function. It is mostly related to the recent observations that in various cardiac diseases longitudinal myocardial function might be impaired earlier than circular fiber activity. It is not known however if longitudinal LV function can improve in the process of pharmacological treatment and if so, whether it recovers in parallel with global LV systolic function.

The assessment of mitral annular motion has been recognized as an accurate method to quantify longitudinal LV function using various techniques. Measurement of mitral annular displacement (MAD) using M-mode echocardiography has been in use since late 60-s but is often limited in patients with suboptimal echo images. Cardiac magnetic resonance (CMR) offers an alternative method of assessing longitudinal LV function not dependent on the acoustic window.

The purpose of this study was to observe changes in LV longitudinal function in CHF patients on optimal pharmacological treatment with beta-blockers using cine CMR.

Methods: The study population included 125 patients with symptoms of chronic heart failure (NYHA class II-III, aged 69 ± 8 yrs, ranged 45 to 94 years old) including 102 patients with LV systolic dysfunction (ejection fraction [EF] $<45\%$) and 23 patients with preserved LV systolic function (EF $\geq 45\%$). All patients were on optimal pharmacological treatment including beta-blockers, ACE inhibitors or angiotensin receptor blockers, aldosteron antagonists and diuretics

The study subjects underwent CMR on a 1.5 Tesla scanner (Signa CV/i, GE Medical Systems) using ECG-triggered breath-hold FIESTA imaging. LV end-diastolic and end-systolic volumes and EF were calculated from a set of short-axis cine images with commercially available MRI-MASS software (MEDIS, Leiden, NL). MAD was measured at the lateral and septal sites in the horizontal long axis (4-chamber) view and at the anterior and inferior sites in the vertical long axis (2-chamber) view and averaged.

Results: Twenty-three patients who died during the 12 months follow-up were excluded from the analysis. Therefore, 102 patients completed the study. Most patients were men (n=91) and were diagnosed with CHF of ischaemic aetiology (n=90). There were no changes in LV end-diastolic volume (217 ± 81 vs 214 ± 80 ml, NS) or end-systolic volume (140 ± 71 vs 136 ± 73 ml, NS) or EF (38 ± 13 vs $40\pm 14\%$, NS). However, MAD increased as a result of treatment from 7.1 ± 3.5 to 8.1 ± 3.6 mm ($p<0.001$). Improvement was observed in the group of patients with impaired global LV systolic function (6.2 ± 2.4 to 7.1 ± 2.9 mm, $p<0.001$) but not in the group of patients with preserved systolic function (11.2 ± 4.0 to 11.9 ± 3.6 mm, NS)

Conclusions: In patients with chronic heart failure longitudinal LV function as assessed by measuring MAD with cine CMR improves as a result of chronic beta-blocker therapy even in the absence of improvement in global LV systolic function.