

Extracellular volume fraction by T1 mapping predicts improvement of left ventricular ejection fraction after catheter ablation in patients with non-ischemic cardiomyopathy and atrial fibrillation

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Background: The Catheter Ablation versus Standard Conventional Therapy in Patients with Left Ventricular Dysfunction and Atrial Fibrillation (CASTLE-AF) trial has shown that the catheter ablation (CA) for atrial fibrillation (AF) significantly reduced the risk of death and hospitalization for heart failure in patients with non-ischemic dilated cardiomyopathy (NIDCM) and AF (N Engl J Med 2018; 378:417–27). In addition, the Catheter Ablation Versus Medical Rate Control in Atrial Fibrillation and Systolic Dysfunction (CAMERA-MRI) study demonstrated that the absence of myocardial fibrosis on late gadolinium enhanced (LGE) magnetic resonance imaging (MRI) is associated with improvement of left ventricular systolic function after CA in NIDCM patients with AF (J Am Coll Cardiol 2017; 70:1949–61). Extracellular volume fraction (ECV) by T1 mapping has emerged as a non-invasive mean to quantify diffuse myocardial fibrosis.

Purpose: The aim of this study was to compare the predictive value of LGE-MRI and ECV by T1 mapping for the prediction of improvement of LVEF after CA in NIDCM patients.

Methods: A total of twenty-eight patients with NIDCM and AF (age: 67±10 years; 25 (89%) male; LVEF: 34.1±8.8%) were studied. Using a 1.5T MR

scanner and 32 channel cardiac coils, cine MRI, LGE-MRI, pre- and post-T1 mapping images of LV wall at mid-ventricular level (modified Look-Locker inversion recovery sequence) were acquired. Myocardial fibrosis on LGE was defined as area with >5SD signal intensity of normal myocardium. ECV from six segments of mid ventricular level were averaged for each patient. All patients underwent CA for AF, and the improvement of LVEF before and after CA were evaluated by echocardiography.

Results: All patients restored sinus rhythm after CA at the time of echocardiography. The mean LVEF was 34.1±8.8% before CA and 49.1±12.0% after CA ($p<0.001$), resulting an improvement of 15.0±11.8%. Significant correlation was found between improvements in LVEF and amount of fibrosis on LGE-MRI ($r=-0.40$, $p=0.034$), improvement of LVEF and ECV ($r=-0.55$, $p=0.008$). In the ROC analysis, ECV had a higher discriminative ability for the improvement of LVEF after CA compared with amount of fibrosis on LGE-MRI (AUC 0.885 vs 0.650) (Figure).

Conclusions: In NIDCM patients with AF, ECV by T1 mapping had better predictive ability for improvement of LVEF after CA in comparison to LGE-MRI.

