Long-term serial changes in left atrial volume and function after catheter ablation for atrial fibrillation

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Background: Catheter ablation for atrial fibrillation (AF) is an effective method to restore and maintain sinus rhythm. The value of left atrial (LA) volume and reservoir function at short-term after ablation have been shown to associate with clinical outcomes. However, data regarding serial changes in LA size and function after the ablation remain scarce.

Purpose: The purpose of this study was to investigate the serial changes in LA volume and function, and their relationship to the AF recurrence in patients who underwent primary ablation for AF and had preserved left ventricular ejection fraction (LVEF).

Methods: We retrospectively reviewed 1,204 patients (age: 72±10 years, male: 72%, LVEF: 62±4%, paroxysmal AF: 66%) for whom both pre- and post-procedural serial echocardiographic data were available. Echocardiography was performed at pre-, 1-year, 2-year and 3-year after the ablation procedure. The association between AF recurrence and changes in echocardiographic parameters were evaluated by A repeated measures ANOVA with a Greenhouse-Geisser correction and Bonferroni tests. The AF recurrence was defined as any documented atrial arrhythmia of > 30 seconds after a single ablation procedure.

Results: During the mean follow-up of 1725±713 days, AF recurrence was observed in 418 patients (34.7%) and persistent AF at last follow-up was 41 patients (3.4%). Patients with AF recurrence had significantly larger LA volume index (LAVI) and lower LA emptying fraction (LAEF) at baseline than those without (50.0±15.5 vs 41.4±14.4 mL/m², P<0.001, and 31.2±14.9 vs 37.7±14.0 %, P<0.001, respectively) and these differences were maintained thereafter during the follow-up. The trend of LAVI decreased until 6 months later and then remained unchanged regardless of the AF recurrence. These trends were maintained in patients divided into initial paroxysmal and persistent AF. The trend of LAEF increased until 6 months later and then gradually decreased regardless of the AF recurrence. These trends were maintained in patients with persistent AF, however, LAEF continued to decline in patients with paroxysmal AF. (Figure)

Conclusions: The catheter ablation was associated with significant reduction in LAVI and improvement of LAEF in patients with persistent AF regardless of recurrent AF. In contrast, LAEF decreased gradually in patients with paroxysmal AF. These findings may suggest LA function in patients with AF declines gradually, even when they are maintained in sinus rhythm. However, both LAVI and LAEF in paroxysmal AF were better than persistent AF, suggesting that catheter ablation may be more effective in the paroxysmal AF stage.