

Editorial



Preserving the Right Ventricular Function: Early Rhythm Control Through Ablation of Persistent Atrial Fibrillation

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Atrial fibrillation (AF) is associated with right ventricular (RV) dysfunction, and the two conditions frequently coexist. It was suggested that AF worsens the RV function by impairing the longitudinal contraction of the RV. Both AF and RV dysfunction can contribute to the development and progression of heart failure with a preserved ejection fraction (HFpEF) by elevating the left ventricular (LV) filling pressure, causing left atrial (LA) hypertension, fibrosis, right atrial (RA) dilatation, RV remodeling, and pulmonary hypertension.¹⁾ Additionally, AF induces RA enlargement, leading to tricuspid annulus dilatation and functional tricuspid regurgitation (TR).²⁾ Moreover, RV dysfunction also contributes to the development of significant TR in AF, especially with a prolonged AF duration.³⁾

A recent study has shown that for patients with AF who have moderate to severe TR, more than two-thirds of those patients experience a reduction in the TR severity after AF ablation. The echocardiographic parameters including the tricuspid annular diameter, TR velocity time constant, and effective regurgitant orifice (ERO) area have shown an improvement post-ablation. Reverse remodeling of the RA and RV end-diastolic area has also been observed following AF ablation. These positive effects of cardiac structural remodeling are particularly associated with the maintenance of sinus rhythm.⁴⁾

Studies on AF ablation have primarily focused on its impact on the LA enlargement and LV function. LA enlargement, an impaired LA function, and electrical remodeling of the LA are associated with a higher incidence of AF and AF recurrence after catheter ablation.^{5,6)} In the serial follow-up of the LA volume and LA function after catheter ablation of AF measured by 3-dimensional echocardiography, the results demonstrated an improvement in the LA volume and function at 1-year of follow-up. Notably, this improvement was more pronounced in persistent AF than paroxysmal AF.⁷⁾ In the CASTLE-AF trial, which compared medical treatment and catheter ablation of AF in patients with heart failure with a left ventricular ejection fraction (LVEF) of less than 35%, AF ablation was associated with an improved LVEF and reduced all-cause mortality.⁸⁾ Although there is evidence suggesting the beneficial effects of AF ablation on the LA and LV function, its impact on the RV function remains not well known.

In this study by Kim et al.,⁹⁾ the researchers investigated the changes in the RV function before and after AF ablation in patients with paroxysmal atrial fibrillation (PAF), persistent

Data Sharing Statement

The data generated in this study are available from the corresponding author upon reasonable request.

Author Contributions

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atrial fibrillation (PeAF), and long-standing persistent atrial fibrillation (LSPeAF). The echocardiographic parameters including the fractional area change (FAC), right ventricular free-wall longitudinal strain (RVFWSL), and right ventricular 4-chamber strain (RV4CSL) were measured before and after the catheter ablation of AF. A total of 164 patients (74 PAF, 47 PeAF, and 43 LSPeAF) were enrolled, and the median age was 60.8 years. Patients with PeAF and LSPeAF had more severe baseline RV dysfunction compared to those with PAF, as evidenced by the RV4CSL and RVFWSL measurements. Interestingly, significant improvements in the RV strain parameters (RVFWSL and RV4CSL) were observed after AF ablation particularly in the PeAF group as compared to both the PAF and LSPeAF groups.

In the PAF groups, because the baseline RV function was relatively preserved, it is expected that the change in the RV function before and after ablation would not be significant. Conversely, in the LSPeAF group, as mentioned in the paper, the irreversible changes in the RV myocardium including fibrosis were substantial, suggesting that the improvement in the RV function would have been minimal even after ablation. However, further research is warranted to investigate whether maintaining sinus rhythm after AF ablation in patients with LSPeAF leads to an improvement in the RV function.

Recently, several trials have shown the effectiveness of early rhythm control in patients with AF. In the EAST-AFNET trial,¹⁰⁾ the early rhythm control strategy for AF was demonstrated to be associated with a lower risk of adverse cardiovascular outcomes compared to usual care. Based on the results of the current study, it is expected that a timely rhythm control strategy through catheter ablation in patients with AF may improve the long-term prognosis in terms of the RV function.

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