The Association Between Left Atrial Strain and Left Atrial Voltage in Patients Undergoing Catheter Ablation for Atrial Fibrillation

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Introduction: Left Atrial (LA) interstitial fibrosis, which disrupts normal electrical conduction, is one of the risk factors for recurrence after catheter ablation for atrial fibrillation (AF). Atrial strain based on speckle tracking method is previously reported to quantify the extent of fibrosis in patients undergoing mitral valve operations for severe mitral regurgitation. Low-voltage zone, identified during sinus rhythm with an electroanatomical mapping system, seems to represent fibrotic remodeling. In the present study, we tested the hypothesis that there would be a good correlation between LA strain and LA voltage.

Methods: A total of 37 patients (male N=30, 64±9 years old, paroxysmal AF N=20) who underwent initial catheter ablation for non-valvular AF was retrospectively analyzed. Transthoracic echocardiography using speckle tracking method (Philips EPIC CVx) during sinus rhythm or AF was conducted the day before catheter ablation and LA longitudinal peak strain for each segment of anterior, septal, posterior, and lateral were obtained. All patients underwent LA voltage mapping using Advisor™ HD grid catheter during sinus rhythm. LA mean voltage excluding pulmonary vein was calculated for each segment of anterior, septal, posterior, and lateral. The correlation between LA strain and mean voltage for each segment was examined.

Result: Nineteen patients were performed speckle tracking echocardiography during sinus rhythm, and 18 patients during AF. All of the patients underwent LA voltage mapping during sinus rhythm before ablation. The number of sampling points was 1119±268 points, and those of each segment points were 324±67, 250±94, 352±86, and 204±48 at anterior, septal, posterior, and lateral, respectively. There was a strong positive correlation between LA strain and LA mean voltage, in particular during sinus rhythm (sinus rhythm, R=0.755, P<0.001; AF, R=0.499, P=0.035). The highest correlation between LA strain and LA mean voltage was seen in the septal during sinus rhythm (R=0.741, P<0.001), whereas it was seen in the lateral during AF (R=0.485, P=0.041).

Conclusion: There was a good correlation between LA strain and LA mean voltage in patients with AF.