The Utility and Limitation of Low Voltage Areas as a Predictor in One-year Clinical Outcome of Trigger-Based Persistent Atrial Fibrillation Ablation

Introduction: Low voltage areas (LVAs) as a substrate for atrial fibrillation (AF) have been reported to be targeted for catheter ablation. However, the change over time of unmodified LVAs in patients with recurrent AF after the initial procedure is unknown. This study aimed to evaluate the impact of LVAs on AF recurrence after trigger-based catheter ablation and the change over time of LVAs in the initial and subsequent procedure in the persistent AF patients without structural heart diseases.

Methods: Consecutive patients undergoing catheter ablation for persistent AF (n=117) were included in this study. Left atrial (LA) voltage maps were constructed during sinus rhythm using multipolar mapping catheter to identify LVA (<0.5 mV). Catheter ablation for all patients underwent pulmonary vein isolation (PVI) and superior vena cava isolation (SVCI), but no modification for LVAs. We divided into two groups based on the presence of LVAs (with or without LVA > 5% of LA surface area) and examined the ratio of AF recurrence after catheter ablation. In the recurrent cases, we compared the LVAs at the subsequent session to them at the first session.

Result: LVAs were observed in 81 patients (69%). Patients with LVAs were significantly older (65 ± 10 vs. 60 ± 10, P=0.006), more likely to be female (28% vs. 8.3%, P=0.016), more hypertension history (67% vs. 44%, P=0.024) and had higher CHA2DS2-VASc score (2.2 ± 1.4 vs. 1.4 ± 1.2, p = 0.002). During 12 months of follow-up, AF recurrence tended to be more frequent in patients with LVAs after the initial session (41/81=51% vs. 12/36=33%, log-rank, P=0.081). However, there was no significant difference between the patients with and without LVAs after multiple procedures (20/81=25% vs. 6/36=17%, log-rank, P=0.322). In 11 patients transformed from persistent to paroxysmal form after the initial procedure, LVAs at the subsequent procedure was significantly decreased compared to them at the initial session (11.2% vs. 1.4%, P=0.005).

Conclusion: The impact of LVAs was limited after the multiple procedures of PVI plus SVCI strategy in persistent AF patients. Additionally, the LVAs decreased in the patients with the transformation from persistent to paroxysmal form after the initial procedure. These findings suggest that thoracic vein isolation is the first target of the catheter ablation of persistent AF even in patients with LVAs.