Tailoring of Ablation Index Based on Left Atrial Wall Thickness Improves Efficacy of Pulmonary Vein Isolation in Atrial Fibrillation

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Introduction: Ablation index (AI) incorporates contact force, time, and radiofrequency energy in a weighted formula, and linearly correlated with the lesion depth. Since wall thickness (WT) in the left atrial (LA)/pulmonary vein (PV) surrounding area is anatomically heterogeneous, AI should be tailored in accordance with the WT to yield the best therapeutic performance in catheter ablation for atrial fibrillation (AF). The aim of this study was to evaluate the efficacy of PV isolation (PVI) using AI tailored by individual WT.

Methods: In 43 patients undergoing PVI, regional WTs (anterior, posterior, roof, and bottom) in the LA/PV surrounding area were measured with intra-cardiac echocardiography (ICE) placed in the LA: average WT was calculated in each region. PVI was performed with the two different AI protocol, fixed AI protocol (FAI) and tailored AI protocol (TAI). In FAI, the maximum AI (530) was applied to the PV anterior wall (the thickest wall) and the values were decreased corresponding to average WT in each region (AI=480, 420, and 450 for roof, posterior, and bottom, respectively, n=23). In TAI, AI in each region was tailored by the regional WT measured by ICE in each patient (n=10); the efficacy of PVI was compared between FAI and TAI.

Result: WTs in the anterior, roof, posterior, and bottom of the left PV were 7.1±0.8, 6.2±1.2, 5.1±0.9, and 5.8±1.3 mm, respectively. Similarly, those of the right-PV were 6.5±1.8, 6.3±1.5, 5.1±1.3, and 4.3±0.7 mm, respectively. The rate of first-pass isolation was similar between FAI and TAI (91% and 95% respectively). The percentage of residual PV gap/potential and/or acute PV reconnection after isoproterenol/adenosine triphosphate infusion was also unchanged between TAI and FAI (15% and 15% respectively). Procedure time for PVI significantly decreased in TAI vs. FAI (by 19%, p=0.02).

Conclusion: WTs in the LA/PV surrounding area were heterogeneous. Tailoring AI by individual WTs improve the efficacy of PVI by shortening the procedure time.