Evaluation of the Optimal Lesion Size Index for Pulmonary Vein Isolation and to Prevent Acute Reconnections of Pulmonary Vein

Yoshio Furukawa
Takahisa Yamada
Takashi Morita
Shunsuke Tamaki
Masato Kawasaki
Atsushi Kikuchi
Masahiro Seo
Jun Nakamura
Makoto Abe
Kyoko Yamamoto
Kiyomi Kayama
Tsutomu Kawai
Masatsugu Kawahira
Kazuya Tanabe
Tetsuya Watanabe

Introduction: Reconnections after pulmonary vein (PV) isolation are explained by insufficient lesion depth and/or discontinuity of radio-frequency (RF) ablation lesions. The lesion size index (LSI) which consist of contact force, time, and power has been developed for safe and effective catheter ablation. This index predict the lesion depth and width in the porcine ventricle. However, little is known about the optimal LSI for PV isolation. We sought to evaluate the optimal lesion size index to perform first pass PVI and to prevent acute reconnections of the PV.

Methods: Fifteen patients were enrolled, who underwent their first time PVI for atrial fibrillation using Ensite 3D mapping system. All patients underwent LSI guided PVI. In first 10 patients, target LSI was 4.0 (Group A) and in last 5 patients, target LSI was 4.5 in posterior and 5.0 in anterior wall (Group B). We evaluate the LSI value, first-pass PV isolation rate, RF time, gap site and acute reconnection rate and site.

Result: There were no significant patients characteristics except the history of cerebral infarction between 2 groups. LSI value was significantly higher in Group B than Group A both left PV {4.1 (3.9-4.3) vs 4.7 (4.6-4.9), p=0.002} and right PV {4.4 (4.2-4.8) vs 5.1 (4.7-5.1), p=0.04}. RF time was no significantly difference between 2 groups. Group B had significantly higher first-pass PV isolation success rate (100% vs 50%, p=0.001) and lower incidence of acute reconnection (0% vs 25%, p=0.03). The distribution of segment of gap conduction after first-pass PV isolation and acute reconnection is shown in Figure.

Conclusion: The LSI could be predict gap conduction and acute reconnection after PV isolation. LSI 4.5 in posterior and 5.0 in anterior wall might be suitable target for PV isolation.