A utility of automatic conduction delay or block line visualization for superior vena cava isolation in patients with atrial fibrillation

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Introduction: Atrial fibrillation (AF) commonly occurs with triggers from the pulmonary veins. However, triggers from non-pulmonary vein foci is an important source of AF. The superior vena cava (SVC) is a major source of non-pulmonary vein foci, and SVC isolation is an essential procedure for the improvement of the clinical outcome of AF. Previous studies have used ultra-high-resolution mapping system (Rhythmia, Boston Scientific) to determine right atrium-SVC conduction patterns and have shown that they can be useful in isolating the SVC safely with fewer ablation lesion. On the other hand, the conduction delay or block is visually recognized automatically as a block line based on the difference in conduction time between two adjacent mapping points, using Carto®3 system version 6 (Biosense Webster). The aim of this study is to determine the efficacy of automatic conduction delay or block (CDB) line visualization for SVC isolation in Carto®3 system version 6.

Methods: Twenty consecutive patients who underwent SVC mapping before SVC isolation using the Carto system were enrolled. During SVC ablation, CDB line visualization was not used from July 2018 to January 2019 (conventional group, n=10), and was used from January 2019 to June 2019 (Ver.6 group, n=10). In the Ver.6 group, radiofrequency ablations were delivered along the line connecting the ends of the visualized conduction delay or block line, and ablation was added by bringing up the “lower threshold setting” until SVC isolation was complete. Circumferential SVC isolation was performed above the sinus node in the conventional group. Efficiency and adverse effects were retrospectively compared between the two groups.

Result: The number of radiofrequency deliveries until SVC isolation in the Ver.6 group patients were significantly less than that of the conventional group (9.5±4.0 vs. 13.8±2.0, p<0.01). There was no significant difference in procedural time between the two groups. The size of the isolated area in ver.6 group patients were significantly larger than that of conventional group patients (16.2±4.5 cm² vs. 10.9±5.0 cm², p = 0.02). There was one case of acute reconduction and another one case of dormant conduction in the conventional group. Sinus node and phrenic nerve injury did not occur in either group.
Conclusion: Using a novel feature of automatic CDB line visualization in the Carto®3 system version 6 for SVC isolation may be safer and lead to a larger isolated area.