Faster mapping for targeted atrial fibrillation ablation using a novel algorithm with a high-density grid style catheter in a Japanese population

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Introduction: Cardiac mapping is an integral part of cardiac electrophysiology studies. In atrial fibrillation (AF), identification of non-PV (pulmonary vein) targets to increase success remains a challenge. Creation of accurate activation and voltage maps not only provides guidance for ablation, but also allows for rapid diagnosis and monitoring of cardiac rhythms. Here, the use of a novel multielectrode grid catheter with the HD Wave configuration, which collects data using only electrodes with adjacent orthogonal bipoles, in mapping patients with AF was examined in a Japanese population.

Methods: Prospectively collected procedural data in AF cases utilizing a new high-density, grid-style mapping catheter was evaluated across 37 centers in Japan. Procedural data including indication for mapping, mapping software configuration (standard bipole vs HD Wave), mapping time, points acquired, ablation locations, and acute outcomes were recorded. Maps were also reconstructed using both the standard and HD Wave mapping configurations for subjective post hoc comparison.

Result: Procedural data from 150 atrial fibrillation (52% paroxysmal, 48% persistent) cases were collected. Double transseptal access was reported in 64 cases (42 paroxysmal, 22 persistent). The mapping catheter was delivered by a Swartz sheath in 78% of the cases, and Esmite AutoMap module was utilized in 91% of the cases. The HD Wave mapping configuration was used in 137 cases, vs. 13 cases mapped in standard bipole configuration. HD Wave collected an average of 11,686.4±7866.2 points in 12.7±5.1 minutes (926.1 points collected/minute) compared to 5,318.8±2844.5 points in 15.7±5.5 minutes (338.8 points collected/minute) using standard configuration. Retrospective, qualitative comparison of voltage maps in the two configurations revealed better point density and identification of smaller low voltage areas when HD Wave was used (Figure). PVI only procedures were reported in 27 of the 150 cases reported (22 in paroxysmal and 5 in persistent cases). Additional ablation target included CTI (52%), roofline (23%), and SVC (17%). 108 cases reported attempts to induce AF after the procedure, 56% of them reported non-inducible AF (5 out of 9 in standard vs. 56 out of 99 in HD Wave).
Conclusion: When a multielectrode, high-density, grid-style catheter was used in the HD Wave configuration, high quality activation and voltage images can be obtained in less than 15 minutes with three times the point collection speed compared to standard configuration. Rapid mapping and acquisition of electrograms with HD Wave result in better delineation of substrate and visualization of anatomical maps.