First clinical experience using a novel temperature-guided ablation catheter in a routine workflow for atrial fibrillation ablation

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Background: Recently, a novel irrigated RF catheter was designed with a diamond-embedded tip for rapid cooling and 6 surface thermocouples to reflect real-time tissue temperature. The new technology allows for temperature-controlled irrigated ablation, very high-resolution electrograms (EGMs) from the split-tip electrode, as well as real-time rapid lesion assessment.

Aim: This study aimed to access clinical performance in terms of lesion formation and procedural safety of the novel DiamondTemp (DT) ablation catheter for atrial fibrillation (AF) ablation under routine clinical conditions.

Methods: In this prospective observational study, 20 patients underwent pulmonary vein isolation (PVI) with the DT catheter in a temperature control mode (60C°/50 W/ 10 seconds). The ipsilateral pulmonary veins (PV) were divided into 6 anatomical segments (12 segments in total) to record ablation data. All patients underwent preprocedural imaging (computer tomography or magnetic resonance imaging (MRI)) and 10 patients received additional postprocedural late gadolinium enhancement (LGE) MRI of the left atrium 3 months after ablation to access lesion formation for each anatomical PV segment and to rule out PV stenosis.

Results: Acute PVI was achieved in all patients. Two patients received additional ablation at the cavotricuspid isthmus due to typical atrial flutter. No charring at the catheter tip was found and no procedure related complications were observed. The mean procedure duration (skin-to-skin) was 106 ± 31.9 minutes, mean LA dwell time was 83 ± 27.0 minutes. RF time was 13.5 ± 5.5 minutes with a mean of 74 ± 32.8 RF applications. We measured a mean impedance drop per RF application of 10.7 ± 4.1 ohm. Fluoroscopy time was 4.2 ± 2.3 minutes and the fluoroscopy dose was 221 ± 215.3 cGy*cm2 at a. LGE MRI at 3 months after ablation demonstrated a homogeneous and continuous ablation lesion set around the ipsilateral PVs and there was no evidence for PV stenosis.

Conclusions: This first clinical series demonstrated that temperature-controlled irrigated ablation resulted in rapid, efficient, and durable PV isolation under routine clinical conditions.