Find me if you can: lessons learned using the novel cartofinder algorithm in a routine workflow for catheter ablation of atrial fibrillation

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Background: CARTOFINDER allows for a simultaneous and automated detection of repetitive focal and rotational activations during electroanatomical mapping using a multi-electrode catheter in patients with atrial fibrillation (AF).

Aim: This study aimed to validate the CARTOFINDER algorithm for the detection of potential drivers for AF under routine clinical conditions and to access the effects of PVI and additional substrate modification on regions of interests (ROI) from CARTOFINDER mapping.

Methods: Forty-four consecutive patients underwent AF ablation for persistent AF using a 3D-mapping system with the novel integrated CARTOFINDER module. All patients presented with persistent AF and mapping was performed using a multi-electrode catheter. The ablation workflow was divided into the following steps: 1. 3D reconstruction of the right (RA) and left atrium (LA). 2. Identification of the individual ROIs separated for focal and rotational activity in the RA and LA. 3. Ablation index guided pulmonary vein isolation (PVI). 4. Repeat mapping for ROIs in the RA and LA. 5. Direct current electrical cardioversion. 6. Confirmation of persistent PVI and bipolar ultra-high density mapping of the RA and LA followed by substrate modification if there was evidence for local bipolar low-voltage in the LA.

Results: Acute PVI was achieved in all patients (100%). In 28% of these patients additional LA substrate modification was performed. AF termination was observed in 4 patients. Mean procedure duration was 137 ± 30 min, mapping time for ROIs in the RA was 8 ± 5 min and 11 ± 5 for the LA, respectively. A mean number of 149 ± 82 ROIs were revealed from CARTOFINDER. In the LA, focal activity was predominantly observed inside the LA appendage (LAA) and in close relationship to the pulmonary vein ostia. The majority of rotational activities was found along the mitral valve annulus. In the RA, the majority of ROIs was found at the septum and in close relationship to the RA appendage. During re-mapping for ROIs after AF ablation we observed the elimination of ROIs close to the linear ablation set for PVI. In addition, rotational activity could not be re-identified at repeat mapping.

Conclusions: ROIs could be discriminated and visualized utilizing CARTOFINDER in all patients. These ROIs might potentially be an additional and individual ablation target beyond PVI in patients with persistent AF.