

A new electrophysiological triad for atrial flutter critical isthmus identification and localization

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Introduction: In a previous retrospective study it was demonstrated that an electrophysiological triad was able to identify critical isthmus in atrial flutter (AFL) patients. This triad is based in the Carto® electroanatomical mapping (EAM) version 7, which displays a histogram of the local activation times (LAT) of the tachycardia cycle length (TCL), in addition to the activation and voltage maps. This study aimed to prospectively assess the ability of an electrophysiological triad to identify and localize the AFL's critical isthmus.

Methods: Prospective analysis of a unicentric registry of individuals who underwent left AFL ablation with Carto® EAM. All patients with non-left AFL, lack of high-density EAM, less than 2000 collected points or lack of mapping in any of the left atrium walls or structures were excluded. Ablation sites of arrhythmia termination were compared to an electrophysiological triad constituted by: areas of low-voltage (0.05 to 0.3mV), sites of deep histogram valleys (LAT-Valleys) with less than 20% density points relative to the highest density zone and a prolonged LAT-Valley duration that included 10% or more of the TCL. The longest LAT-Valley was designated as the primary valley, while additional valleys were named as secondary.

Results: A total of 12 patients (9 men, median age 72 IQR 67-75 years) were included. All patients presented with left AFL and 67% had a previous atrial fibrillation and/or flutter ablation. The median TCL and number collected points were 250 (230–290) milliseconds and 3150 (IQR 2340–3870) points, respectively. All AFL presented with at least 1 LAT-Valley in the analysed histograms, which corresponded to heterogeneous low-voltage areas (0.05 to 0.3mV) and encompassed more than 10% of TCL. Eleven of the 12 patients presented with at least 1 secondary LAT-Valley. All arrhythmias were effectively terminated after undergoing radiofrequency ablation in the primary or the secondary LAT-Valley location.

Conclusion: In a prospective analysis, an electrophysiological triad was able to identify the AFL critical isthmus in all patients. Further studies are needed to assess the usefulness of this algorithm to improve catheter ablation outcomes.