Characterization of temporal electrical activity patterns for detection of critical isthmus regions of recurrent atypical atrial flutter

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January 14, 2021

Abstract

Introduction Identifying the critical isthmus region (CIR) of complex atrial tachycardias (AT) is challenging. The Lumipoint® (LP) software, developed for the Rhythmia® mapping system, aims to facilitate successful termination of ATs by identifying the CIR. Objective Objective of this study was to evaluate specificity and sensitivity of LP regarding arrhythmia-relevant CIR detection in patients with atypical-atrial-flutter (AAF). Methods In this retrospective analysis we analyzed 57 AAF-forms. Electrical activity (EA) was mapped over tachycardia cycle length resulting in 2-dimensional EA pattern. The hypothesis was that an EA minimum suggests a potential CIR with slow-conduction-zone. Results A total of n=33 patients were included. LP-algorithm identified a mean of 2.4 EA minima and 4.4 suggested CIRs per AAF-form. Overall, we observed a low specificity with 12.3% but a high sensitivity of 98.2%. Detailed EA analysis revealed that depth ([?]20%) and width (>50ms) of EA minima were the best predictors of relevant CIRs. Wide minima occurred rarely (17.5%), while low minima were more frequently present (75.4%). Minima with a depth of EA[?]20% showed the best sensitivity and specificity overall (95% and 60%, respectively). Analysis in recurrent ablations in 5 patients presenting de-novo AAF revealed that the CIR of de-novo AAF was already detected by LP during the index procedure. Conclusion The LP algorithm provides an excellent sensitivity (98.2%), but poor specificity (12.3%) to detect the CIR in AAF. Specificity improved by preselection of the lowest and widest EA minima. In addition, there might be role of initial bystander CIRs becoming relevant for future AAFs

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