Substrate mapping to detect abnormal atrial endocardium with slow conduction in patients with atypical right atrial flutter

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摘要

Abstract

OBJECTIVES: The purpose of this study was to investigate the relationship between the abnormal substrate and peak negative voltage (PNV) in the right atrium (RA) with atypical flutter. BACKGROUND: The impact of a local abnormally low voltage electrogram on the local activation pattern and velocity of atrial flutter (AFL) remains unclear. METHODS: Twelve patients with clinically documented AFL were included to undergo noncontact mapping of the RA. The atrial substrate was characterized by the: 1) activation mapping; 2) high-density voltage mapping; and 3) conduction velocity along the flutter re-entrant circuit. The normalized PNV (i.e., the relative ratio to the maximal PNV) in each virtual electrode recording was used to produce the voltage maps of the entire chamber. The protected isthmus was bordered by low voltage zones. RESULTS: Atypical AFL of the RA was induced by atrial pacing in 12 patients, including 10 upper loop re-entry and 2 RA free wall re-entry flutter. These protected isthmuses were located near the crista terminalis. The mean width of the protected isthmus was 1.7 +/- 0.3 cm and mean voltage at the isthmus was -0.91 +/- 0.39 mV. The conduction velocities within these paths were significantly slower than outside the path (0.30 +/- 0.18 m/s vs. 1.14 +/- 0.41 m/s, respectively; p = 0.004). The ratiometric PNV of 37.6% of the maximal PNV had the best cut-off value to predict slow conduction, with a high sensitivity (92.3%) and specificity (85.7%). CONCLUSIONS: Characterization of the RA substrate in terms of the unipolar PNV is an effective predictor of the slow conduction path within the critical isthmus of the re-entrant circuit.