The influence of cardiac ablation on the electrophysiological characterization of rat isolated atrium: preliminary analysis

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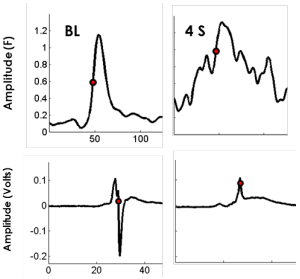
Introduction: Atrial fibrillation (AF) is the most common cardiac arrhythmia seen in the clinical practice and its treatment by antiarrhythmic drugs is still non-effective. Radiofrequency catheter ablation (RFA) is widely accepted as a strategy to prevent AF. This study analyzes the electrophysiological impact of different RFA strategies through a controlled animal protocol.

Methods: The electrical activity of the isolated right atrium of rats, under different RFA strategies on the epicardium (0.5, 1.5, 2, 2.5, 3, 4 s), was acquired for 4 s on the epicardium (Electrical Mapping) and simultaneously on the endocardium (Optical Mapping). Analyses were concentrated on time and frequency, through analysis of optical action potentials (OAPs) and electrograms (EGMS) signal's morphology, local activation time (LAT), isochronous maps, conduction velocity (CV), dominant frequency (DF) and organization index (OI).

Results: The morphology of OAPs and EGMs was altered as the RFA increased. EGMs present a lower negative peak after 2.5 s. The correlation mostly decreased after RFA of 2.5 s in the ablated area. The difference of LAT times of EMGs increased from 10.8 to 23.9 ms as the RFA time increases, and from 8.7 to 76.6 ms for OAPs. CV, reduced from 862 to 5 mm/s (4 s) within the ablated area. Action potential duration increase until 2.5 s of RFA and then decreased. DF maps up to RFA of 2.5 s have large areas of 6.7 Hz (baseline) and changed within 5.4 and 9.4 Hz in the ablated area, whereas the DF of EGMs was 4.7 Hz (4 s). The OI for the OAPs in the ablated area is reduced, in contrast to the EGMs.



Morphology changes after RFA strategies

Discussion: The ablated area presents electrophysiology differences in time and frequency when compared with areas underneath the contact electrodes area. Changes in morphology, time and frequency are detected after 2.5 s of RFA.