Talk announcement

Argyrios Petras
(RICAM)

Tuesday, May 9, 2023
13:45, S2 416-1

Computational assessment of High Power Short Duration (HPSD) protocols in cardiac radiofrequency ablation

Radiofrequency catheter ablation (RFA) is the cornerstone treatment for cardiac arrhythmias. The generated lesions depend mainly on the power delivered to the tissue, the catheter stability, and the contact force (CF) over time. Standard RFA protocols tune applied power and duration on the basis of the arrhythmogenic substrate, and the general consensus is to limit the maximum power to 30-50W over 30-90s. Nevertheless, catheter stability and optimal CF over time are challenging to keep in a beating heart, possibly hampering the creation of effective lines of electrical block and requiring a second procedure. In this scenario, a new RFA paradigm has emerged in the last years: the high-power short-duration (HPSD) protocols relies on the application of significantly higher power (70-90W) for a significantly shorter time (4-8s). Relying on the computational model we developed for RFA accounting for the mechanical properties of the cardiac tissue, we studied safety and effectiveness of three different HPSD protocols (70W/8s, 80W/6s, 90W/4s) for two different types of electrode tips (one spherical and one cylindrical). Safety was assessed in terms of steam pop formation (tissue temperature above 97 C) and charring initiation (blood temperature above 80 C), while efficacy was assessed in comparison to standard protocols. We considered, for each HPSD protocol, different ablation settings in terms of CF (5-20g), coolant saline irrigation (17-60mL/min) and blood flow to mimic different location of the target tissue in the heart. The HPSD protocols were applied to both atrial and ventricular tissue, equipped with human electrical and thermal characteristic. In this talk we will present the results and the conclusions of our study.