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Paper Title: Predicting damage characteristics of RF ablation targets based on SVR algorithm

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Abstract

Atrial fibrillation(AF) is a very dangerous arrhythmia disease that seriously affects human health. Radiofrequency(RF) ablation technique is a new surgical treatment modality that is widely used in the treatment of atrial fibrillation. There are two ablation modes of radiofrequency ablation(RFCA), namely low-power long-duration(LPLD) and high-power short-duration(HPSD). Among them, high-power short-duration radiofrequency catheter ablation significantly improves the efficiency of the procedure and has very few complications, which is a hot topic of current research, but the unpredictable injury characteristics limit the development of radiofrequency ablation. In this study, we will conduct an ex vivo experiment of radiofrequency catheter ablation with high-power short-duration on porcine heart to restore the actual clinical surgical environment as much as possible. The data between the six ablation parameters of power, ablation time, contact force, initial impedance, impedance drop and temperature rise and the four injury characteristics of surface width, maximum width, injury depth and injury volume were compiled to obtain 111 sets of experimental data. Support vector regression(SVR) algorithm was used to predict the data by machine learning regression, and the evaluation index was used to assess the merit of the regression model. According to the results, there was a correlation between ablation parameters and damage characteristics, and the support vector regression model could accurately predict the damage characteristics of the radiofrequency ablation target.