

Using High-resolution voltage maps to predict “redo” in the treatment of atrial fibrillation (AF)

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Aims: High-resolution voltage maps (HRVM) are used as a predictor tool of the post-ablation recurrence of AF. This study aims to assess the statistical power of electrical biomarkers extracted from the HRVM. This paper is a follow-up from a previous analysis, with the number of patients in the cohort augmented from 98 to 139. These patients are treated for AF. We observe that Atrial fibrillation Recurrence (AFR) is related to lower mean voltage of the patient’s left atrium.

Methods: With the same catheter used in the ablation procedure, an acquisition of HRVM was performed on the left atrium (Rhythmia, Boston Scientific). Bipolar voltage maps were evaluated with two electrical biomarkers and one geometrical characteristic (Area). Supervised classifier (from Matlab Machine Learning Toolbox) is used, specifically, the logistic regression and the coarse tree classifiers.

Results: AUC, accuracy and confusion matrices were compared between the two classifiers. For the cohort of 98 patients, logistic regression classifier accuracy’s is 76.5%; ACU=0.74 and coarse tree’s accuracy is 70.4%; ACU=0.63. The cohort of 139 patients gives a logistic classification accuracy of 77.0%; AUC=0.74 and coarse tree’s accuracy is 77.0%; AUC=0.57.

Conclusions: Slight improvement in classification is reported when increasing the sample size (n=139 and before n=98). This minor improvement is presumably due to the fact that the HRVMs are not enough to predict redo with very high accuracy. More comprehensive classifiers with combination of clinical, demographical and comorbidities should somewhat improve the prediction of future redo procedure for a given patient.