Temporal Stability of Dominant Frequency as Predictor of Atrial Fibrillation Recurrence

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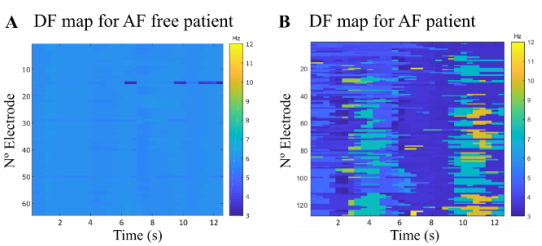
Catheter ablation is one of the main therapies for restoring sinus rhythm in patients with atrial fibrillation (AF), yet AF termination ratios are far from satisfactory. The goal of this work is to study if short/long-term stability of dominant frequencies (DFs) of electrograms (EGMs) can be used as predictor of AF recurrence.

EGMs were recorded from 29 AF patients using 64-pole basket catheters during the ablation procedure. DFs before ablation were obtained for 4-second overlapping fragments of EGM recordings with a 0.4 s shift, and their temporal stability was evaluated for short-term (between 4 and 12 s) and long-term time intervals (> 10 min). Patients were classified as AF (N=15) if sinus rhythm was not maintained in a 12-month post-ablation follow-up, and AF free otherwise (N=14). Student's t-test was applied for comparison of data with normal distributions, and Wilcoxon test otherwise. Normality was tested using a Kolmogorov-Smirnov test (alpha=0.05).

Short-term DF evolution presented significant differences between AF and AF free patients. Short-term DFs variability in patients in which the ablation procedure was effective were significantly lower than in those patients that remain in AF after 12 months (AF free 0.76±0.38 Hz vs. AF 0.96±0.46 Hz, $p<0.001$). The difference between the median value of the DFs (AF 0.60±0.46 Hz, AF free 0.39±0.36 Hz, $p<0.001$) and the difference between the mean DF (AF 0.52±0.37 Hz, AF free 0.36±0.29 Hz, $p<0.001$) were also significant. Regarding long-term DF stability, patients that remained in AF presented higher mean differences between DFs (0.91±0.40 Hz) than those in which the ablation was effective (0.53±0.22 Hz, $p=0.025$).

Short- and long-term temporal stability of DF-based parameters of EGM signals is associated with the success of ablative therapies for AF patients.



Temporal evolution of dominant frequency before ablation of each electrode.