Persistent Atrial Fibrillation Dominant Frequency on Standard ECG Predicts Catheter Ablation Outcome

M. Garibaldi[1], V. Zarzoso[1], D.G. Latcu[2], M. Meo[1], O. Meste[1], I. Popescu[2], N. Saoudi[2]

[1] *Laboratoire I3S, Université Nice Sophia Antipolis, CNRS, Sophia Antipolis, France*
[2] *Centre Hospitalier Princesse Grace, Monaco*

Introduction.

Atrial fibrillation dominant frequency (AFDF) has been reported to play a role as a predictor of radiofrequency catheter ablation (CA) outcome. Changes in AFDF induced by CA has been linked to CA outcome, but only endocardial recordings (EGM) and surface ECG manual computations have been considered. We studied the role of AFDF variations observed in the ECG for CA outcome prediction in persistent AF.

Methods.

Standard 12-lead ECG and an intracardiac reference (left atrial appendage) in 20 consecutive patients (pts; 19 males, 60 ± 11 y) undergoing CA were acquired and analyzed prospectively. All pts underwent stepwise CA for persistent AF (median AF episode duration of 4.5 months - m, 2 to 84). CA success was defined as freedom from documented sustained AF recurrence during follow-up. ECG and EGM AFDF were analyzed before ablation and after pulmonary vein isolation (PVI). Ventricular interference and other artifacts were suppressed by an independent component analysis of the 12-lead ECG, yielding an atrial activity (AA) signal estimate over the whole recording. The ECG AFDF was then computed from the average periodogram of the AA signal. Three AFDF-derived parameters were considered: short-term stationarity of pre-procedural AFDF (expressed in terms of standard deviation), correlation between EGM and ECG pre-procedural AFDF and change in AFDF after PVI.

Results.

After 1.15 procedures/pt and a median follow-up of 9.5 m (4 to 19), CA was successful in 13 pts (65%). Lower ECG and EGM AFDF variability predicted CA outcome (ECG: 0.41 ± 0.07 vs 0.72 ± 0.23, $p=0.01$, EGM: 0.21 ± 0.13 vs 0.36 ± 0.12 Hz, $p=0.03$ for successful vs unsuccessful procedures, respectively). ECG-EGM correlation was found to be stronger in success group (0.06 ± 0.04 vs 0.22 ± 0.25, $p=0.04$). A decrease of ECG and EGM AFDF after PVI was also associated with positive outcome (ECG: 0.42 ± 0.73 vs -0.23 ± 0.43 Hz, $p=0.04$, EGM: 0.28 ± 0.36 vs 0.08 ± 0.26 Hz, $p=0.04$).

Conclusion.

Higher stationarity on 12-lead ECG during persistent AF is linked to successful CA and may improve patient selection. Better correlation between ECG and EGM pre-procedural AFDF as well as decrease of AFDF on ECG by PVI are also associated with CA success.