

Bi-Atrial Dominant Frequency Values and Gradients Can Help Discard Patients with Persistent Atrial Fibrillation Unresponsive to Ablation

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Aims. Dominant frequency (DF) of intracardiac electrograms (EGM) is a surrogate of atrial electro-anatomical remodeling (EAR) in persistent atrial fibrillation (pAF). We hypothesized that high bi-atrial EGM DFs and negative left-to-right DF gradients are independent predictors of ablation outcome in pAF.

Methods. In 40 consecutive patients, pts (61 ± 8 y, sustained AF 19 ± 11 m), pulmonary vein isolation and left atrium (LA) ablation were performed until pAF termination or cardioversion. 10-sec EGMs epochs were synchronously recorded before ablation at the right atrial appendage (RAA), the left atrial appendage (LAA) and the coronary sinus (CS). DF was defined as the highest peak within the [3-15]Hz EGM power spectrum. Left-to-right DF gradients were calculated as the difference between CS and RAA DFs, and between LAA and RAA DFs.

Results. pAF was terminated within the LA in 70% (LT) of the pts, while 30% (NLT) were not. NLT pts displayed significantly higher bi-atrial and CS DFs, more negative CS-to-RAA and reverse LAA-to-RAA DF gradients than LT pts, indicative of an advanced bi-atrial EAR. Both the RAA DF and CS-to-RAA DF gradient had the best predictive values for procedural outcome (AUC/PPV/NPV of 0.86/0.53/0.95 and 0.84/0.81/0.90, respectively). Moreover, CS-to-RAA DF gradient had better discriminative performance compared to LAA-to-RAA DF gradient [AUC 0.84 vs. 0.74], suggestive of a possible mechanistic role of CS in pAF refractory to ablation.

Conclusion. Our findings suggest that bi-atrial and CS DF values and left-to-right DF gradients can help discard pAF pts not suitable for sinus rhythm restoration by catheter ablation.

Table. Classification results between NLT and LT patients

Features	Threshold	AUC[95% CI]	PPV	NPV	p-value
LAA DF	≥ 5.64 Hz	0.73[0.57;0.89]	42%	93%	0.005
RAA DF	≥ 5.92 Hz	0.86[0.75;0.97]	53%	95%	0.001
CS DF	≥ 5.61 Hz	0.69[0.52;0.87]	50%	90%	0.05
LAA-to-RAA Δ DF	≤ -0.44 Hz	0.74[0.56;0.92]	71%	81%	0.01
CS-to-RAA Δ DF	≤ -0.94 Hz	0.84[0.68;0.99]	89%	90%	0.001