Windowed Cross-Correlation to Assess the Interatrial Coupling During Persistent Atrial Fibrillation

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**Aims.** Non-stationarity of intracardiac electrograms (EGMs) during persistent atrial fibrillation (pAF) precludes the use of cross-correlation to quantify the association between EGMs. We hypothesized that windowed cross-correlation (WCC is largely used in psychotherapy to assess nonverbal synchrony between patient and therapist) may help assess the strength of coupling between atrial regions and predict ablation outcomes.

**Methods.** In 40 patients (61±8 y, sustained AF 19±11 m), pulmonary vein isolation and left atrium (LA) ablation were performed until pAF termination or cardioversion. 20-sec EGMs were synchronously recorded before ablation at the right (RAA) and left (LAA) atrial appendage and the coronary sinus (CS). Following rectification, [1-20] Hz bandpass filtering and normalization, the EGMs were cross-correlated in windowed segments of one second duration for positive and negative time-lags up to 250 ms. The coupling between two EGMs was defined as the average of absolute cross-correlations over the entire 20-sec interval (Figure, panel A).

**Results.** pAF was terminated within the LA in 70% (LT - left terminated) of the patients, while 30% (NLT - not left terminated) were not. We found that (1) NLT patients displayed lower coupling between the two appendages and CS (p<0.05 RAA-CS) compared to LT patients, and (2) the coupling between RAA and LAA was similar among the subgroups.

**Conclusion.** Windowed cross-correlation appears to be a promising tool for visualizing the dynamics of interatrial coupling and identification of pAF unresponsive to ablation.