Contribution of Left and Right Atrial Appendage Activities to ECG Fibrillation Waves

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Introduction

- It was recently shown that atrial fibrillation (AF) waves on chest lead V_1 adequately reflect right atrial (RA) appendage (RAA) activity during long standing persistent AF (LS-pAF)[1].
- The contribution of the left atrial (LA) activity to chest leads AF wavess, however, remains unknown.

➔ Our study is aimed at evaluating the respective contribution of the RA and left atrial (LA) depolarization to ECG chest leads AF waves during LS-pAF.

Methods

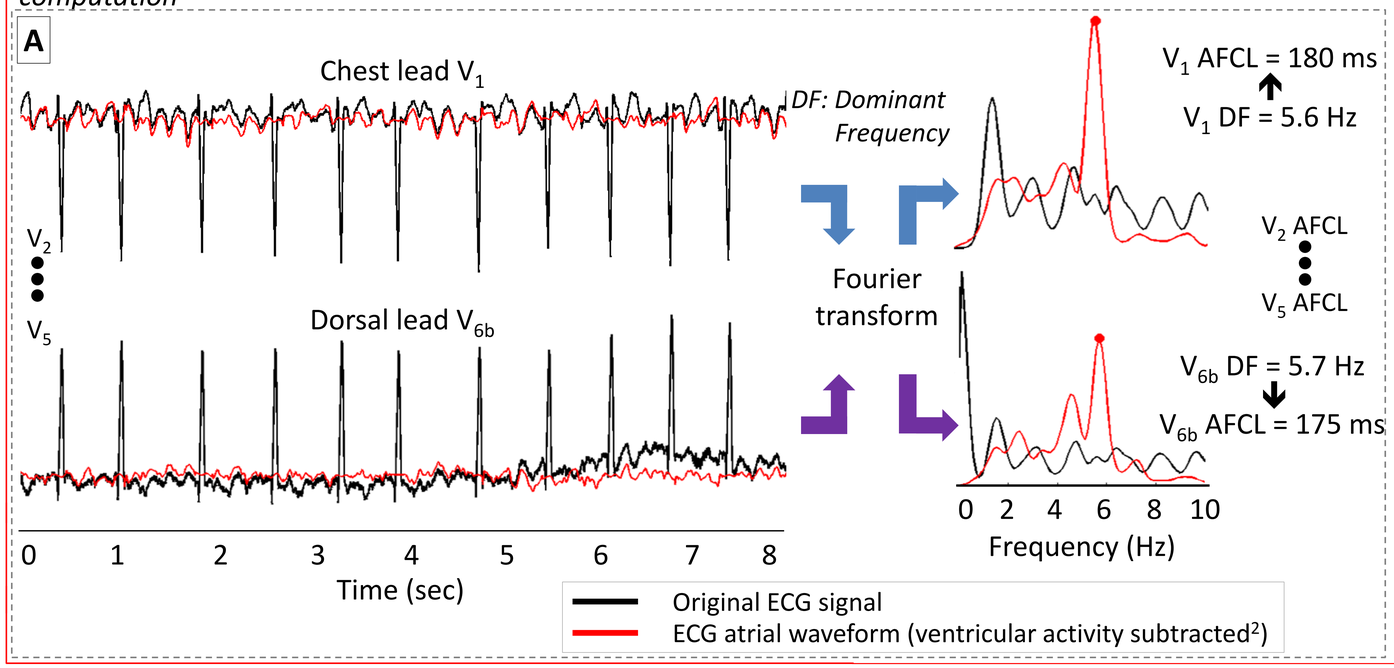
Clinical Characteristics

- Prior to ablation, four catheters (CAT) were introduced in 10 consecutive patients (60±5 y, continuous AF duration 22±14 m):
  1. Quadripolar CAT in the RAA.
  2. Decapolar CAT in the coronary sinus (CS).
  3. Duodecapolar CAT in the LA appendage (LAA).
- 10-sec epochs for a total duration of 270 sec were used.
- Chest lead V_6 was placed in the back (V_{6b}) to improve antero-posterior recordings.

Signal Processing

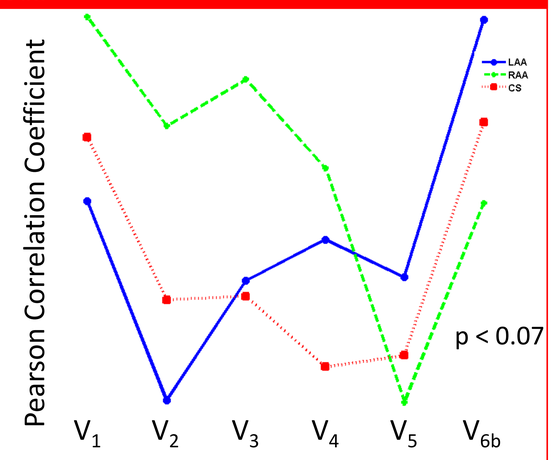
- The figure below illustrates the signal processing stages.

Panel A: QRST cancellation was performed on ECG waveforms[2] followed by an automatic ECG AFCL computation



Results

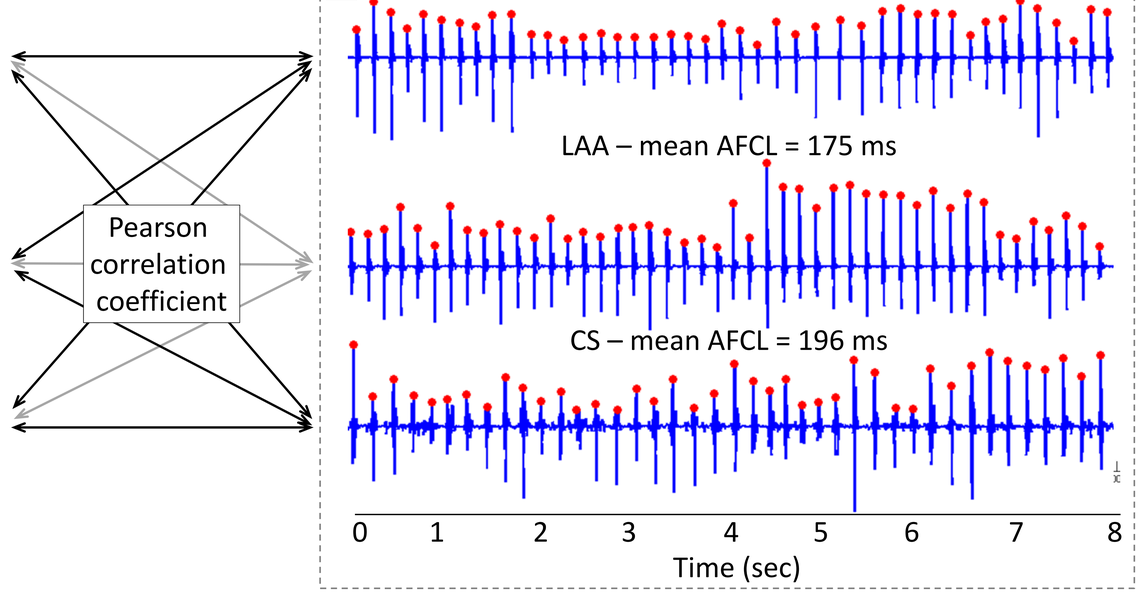
- The correlation between RAA and chest leads AF cycle length (AFCL) was maximal for V_1 and progressively dropped till V_5, with a moderate rise of V_{6b}.
- LAA AFCL showed the opposite pattern with the highest correlation in V_{6b} and the lowest one in V_2.
- The correlation of CS AFCL was similar to the LAA one, but of lower magnitude.



Conclusion

- Our preliminary results suggest that the respective contribution of RAA and LAA activities can be estimated using a modified surface ECG.
- Whether this technique has the potential to guide ablation of LA and RA drivers in LS-pAF needs further validation.

Panel B: automatic extraction of intracardiac local activation times



1 – Petrutiu S. et al. *JCE* 2009; 20: 1231-6

2 – Lemay M. et al. *IEEE Trans Biomed Eng* 2007; 54: 542-6