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 V₁ 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 waves, 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.

Clinical Characteristics

- Prior to ablation, four catheters (CAT) were introduced in 10 consecutive patients (60±5 y, continuous AF duration 22±14 m):
  1. Quadrupolar 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 V₆ was placed in the back (V₆b) to improve antero-posterior recordings.

Signal Processing

- The figure below illustrates the signal processing stages.

Panel A: QRS cancellation was performed on ECG waveforms² followed by an automatic ECG AFCL computation

Methods

- The correlation between RAA and chest leads AF cycle length (AFCL) was maximal for V₁ and progressively dropped till V₅, with a moderate rise of V₆b.
- LAA AFCL showed the opposite pattern with the highest correlation in V₆b and the lowest one in V₂.
- 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.

Results

PEARSON CORRELATION COEFFICIENT

Panel B: automatic extraction of intracardiac local activation times

RAA – mean AFCL = 188 ms
LAA – mean AFCL = 175 ms
CS – mean AFCL = 196 ms

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