Atrial Unipolar Electrogram Filtering To Better Delineate Amplitude And Morphology During Radiofrequency Ablation

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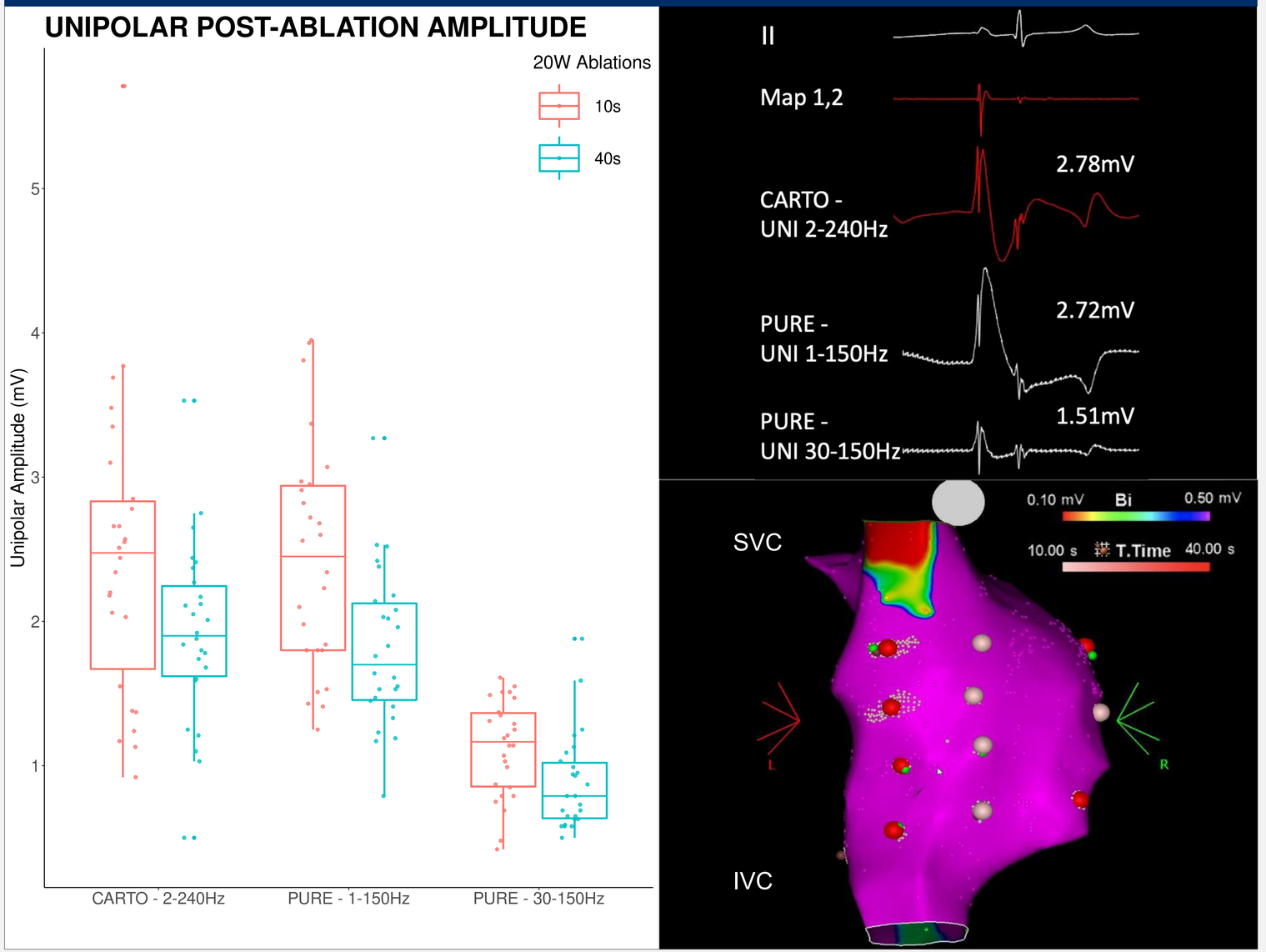
INTRODUCTION

- Unipolar (UNI) electrogram (EGM) changes during radiofrequency (RF) ablation have been correlated to lesion size and/or transmurality in pre-clinical models[1].
- Current of injury during (COI) and immediately following lesion delivery can limit real-time assessment of unipolar EGMs[2].
- The purpose of this study was to assess UNI-EGMs during RFA in the right atrium with PURE EP signal processing.

METHODS

- Four Yorkshire swine (male, 65.5±3.8kg) underwent right atrial mapping using the CARTO 3 system and the ST-SF ablation catheter.
- Lesions (13±2) were delivered at two energy parameters: 20W, 10s and 20W, 40s.
- UNI-EGMs were acquired using PURE EP recording system with WCT+ unipolar reference. PURE EP UNI-EGM peak-to-peak amplitude was recorded at two filter settings: 1-150Hz (HP-1) and 30-150Hz (HP-30). CARTO UNI-EGM amplitude was recorded at 2-240Hz.
- Data were fit to a linear mixed model by restricted maximum likelihood method. Filter setting and ablation duration were treated as independent fixed effects with per subject random effects. Pairwise comparisons were calculated using Kenward-Roger degrees of freedom and Tukey's multiple comparisons adjustment.

RESULTS



RESULTS

- Post-RF UNI-EGM amplitudes differed across filter settings ($F(2, 149.09) = 56.78$, $p < .001$), with PURE EP HP-30 filtering causing the greatest decrease in amplitude ($t(149.09) = -9.46$, $p < .001$).
- Multiple comparisons revealed no difference between standard filtered amplitudes across systems (HP-1: 2.12±0.75mV vs CARTO: 2.18±0.89mV, $t(149) = 0.48$, $p = 0.88$). HP-30 reduced UNI amplitude by greater than 50% (HP-1: 2.12±0.75mV vs HP-30: 1.00±0.35mV, $t(149) = 8.98$, $p < 0.001$) compared to PURE EP baseline filtering.

CONCLUSIONS

- Decreased amplitude with the use of HP-30 may be primarily attributable to the reduction of COI associated with increased filtering.
- Increased high-pass filtering with PURE EP recording system can reduce COI caused by RFA.
- Enhanced signal processing may improve real-time UNI-EGM assessment to better guide ablation delivery.

REFERENCES

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