

Temporal Analysis of Intracardiac Electrograms during Pulsed-Field Ablation

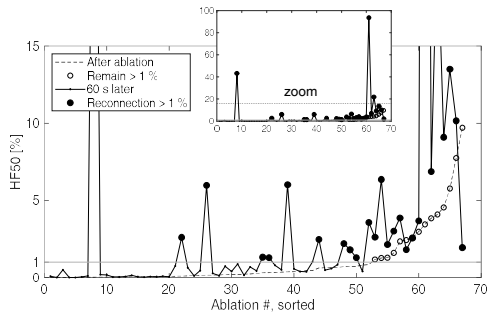
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The goal of the novel pulsed-field ablation (PFA) technology is the irreversible destruction of the myocardial cell membrane. However, a reliable measure to identify and predict durable lesions during the intervention is not available.

We included 18 consecutive patients with 72 pulmonary veins (PV) referred for catheter ablation of atrial fibrillation. The pentaspline ablation catheter (Farawave, Boston Scientific) was positioned in basket configuration at the PV ostium. After first pulse application, a 60 s waiting period was performed with the catheter kept at the same location. The EGM before and after ablation were exported and analyzed based on its bipolar voltage amplitude and frequency composition using FFT. A cut-off at 50 Hz to calculate the power of the high frequency band (HF50) for near-field discrimination was applied. Irreversible lesions were defined as HF50 below 1%, relative to the power in the same frequency band before ablation.

After exclusion of five ablations (due to noise), we analyzed 67 applications. Immediately after ablation, HF50 below 1% was observed in 41 applications (61%) (small points in dotted line in Figure). Of these, 10 values recovered to >1% after 60 s, resulting in a specificity of 62% to predict irreversible lesions immediately after ablation, with a sensitivity of 100%. Changes of bipolar voltage amplitude could not be identified to predict irreversible lesion sets.



Frequency analysis of the intracardiac EGM using a HF50 cut-off of 1% after ablation could reliably identify effective applications.

Ablation criteria: HF50 < 1%
 Predicted (immediately after)

Actual (60s later)		P	N
	P	41	0
	N	10	16

The impact of additional ablations on the temporal behavior of the features and the value of unipolar EGM analysis without dependency on catheter orientation warrants further investigation.