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First Case of Automatic His Potential Detection With a Novel Ultra High-density Electroanatomical Mapping System for AV Nodal Ablation

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Abstract

A 74-year old was considered for atrioventricular (AV) nodal ablation in view of atrial fibrillation (AF) with poorly controlled ventricular rate despite being on amiodarone. Targeted AV nodal ablation was successfully performed after identifying the target site for ablation by reviewing an ultra high-density map of the His region produced by automatic electrogram annotation.

Key words: His bundle, atrioventricular node, cardiac mapping, catheter ablation

Case presentation

A 74-year old was referred to us for atrioventricular (AV) nodal ablation in view of atrial fibrillation (AF) with poorly controlled ventricular rate despite being on amiodarone. The patient already had a CRT-pacemaker implanted. Electroanatomical mapping using a novel ultra-high density mapping system (Rhythmia TM, Boston Scientific) was conducted as previously described [1,2]. A decapolar catheter was placed in the coronary sinus (CS) for timing reference. A mini basket (1.8 cm diameter), containing 8 splines of 8 electrodes (total 64 electrodes, 2.5 mm spacing) is used to collect mapping data in the system. The system allows automatic acquisition of electrograms and location information based on a predefined set of beat acceptance criteria, and stores them for later review. Despite the presence of a right ventricular and coronary sinus pacemaker leads, the mapping catheter could be moved within the atrial and ventricular cavities under fluoroscopic guidance. Voltage and activation maps of the right atrial septum were acquired simultaneously with the mapping system capable of automatic signal annotation. A total of 2.315 mapping points were acquired in 4:23 minutes from 98 heart beats. The window of interest for signal annotation was changed from the atrial to the His potential, and the voltage range was set to 0.05 mV - 0.5 mV to detect low-amplitude signals [**Figure 1**].

The target location for ablation was selected in the review mode by assessing the largest His signal with a small atrial potential acquired during mapping. A single pulse of 70 Watts and 70ºC (non-irrigated 4mm tip catheter) led to complete atrioventricular block and subsequent backup-pacing by the CRT-pacemaker. Total fluoroscopy time was 58 seconds with a dose of 100 cGycm^2.

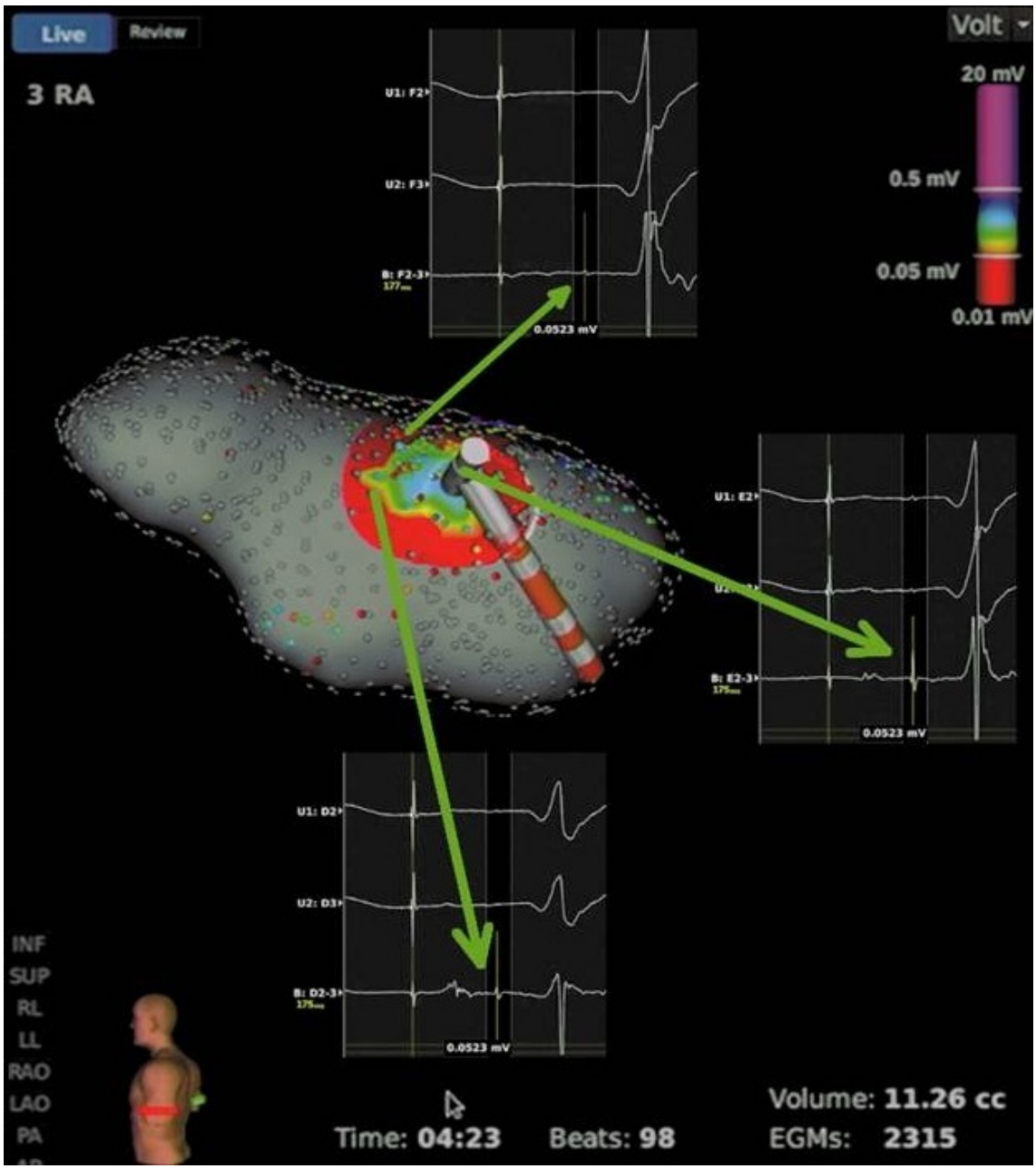

Figure 1: Right atrial septal map from left lateral view. By changing the window of interest to the His potential and reducing the voltage calipers to 0.05 - 0.5 mV (color bar) the system automatically generated this voltage map. Areas shown in red indicate His potentials below 0.05 mV with a gradient from yellow to blue representing increasing amplitudes of the His signal. In the review mode, different EGM characteristics with respect to A, His and V amplitudes can be appreciated. Please note the EGM on the ablation catheter that is located in the pre-specified area. AV block occurred after 3seconds of RF ablation.

Discussion

To the best of our knowledge, this is the first report documenting the use of a novel ultra-high-density mapping system in a patient for AV nodal ablation. The suggested approach is unique as (1) a high-density right atrial septum map was rapidly acquired and automatically annotated, and (2) by changing the window of interest to the His potential, low voltage potentials were automatically detected and correctly annotated allowing for a pre-specified and targeted ablation. Future work will determine if this approach is also useful for the detection of other low voltage potentials like late potentials in ventricular tachycardia ablation or pulmonary vein potentials for gap identification after pulmonary vein isolation.

Disclosures

Dr. Bollmann has received moderate consulting and lecture fees from Boston Scientific.

References

1. Yeo WT, Sporton SCE, Dhinoja M, Schilling RJ, Earley MJ. Utility of mapping signals to improve precision of atrioventricular node ablation. Pacing Clin Electrophysiol PACE 2013; 36:1357-1363.

2. Bollmann A, Hilbert S, John S, Kosiuk J, Hindricks G. Insights from preclinical ultra high-density electroanatomical sinus node mapping. Europace. 2015 Mar;17(3):489-94.