EP CASE REPORT

Real-time multielectrode mapping of pulmonary vein gap closure

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Pulmonary vein (PV) reconnection represents the main cause of atrial fibrillation (AF) recurrence after pulmonary vein isolation (PVI).[1] Multielectrode catheters with closely spaced electrodes permit higher resolution mapping which could improve the detection of residual PV potentials in reconnected PVs.[2] Recently, a software designed to allow mapping data to be visualized in real time from the current location of a multielectrode catheter has been proposed to facilitate the identification of gaps in reconnected PVs. However, the interpretation of real-time multielectrode maps of reconnected veins can be challenging due to the existence of far-field signals that cause incorrect annotation of local activation time (LAT). Furthermore, there is no established protocol for the acquisition and interpretation of these maps. We describe a case report of a patient undergoing PV re-isolation guided by real-time multielectrode mapping.

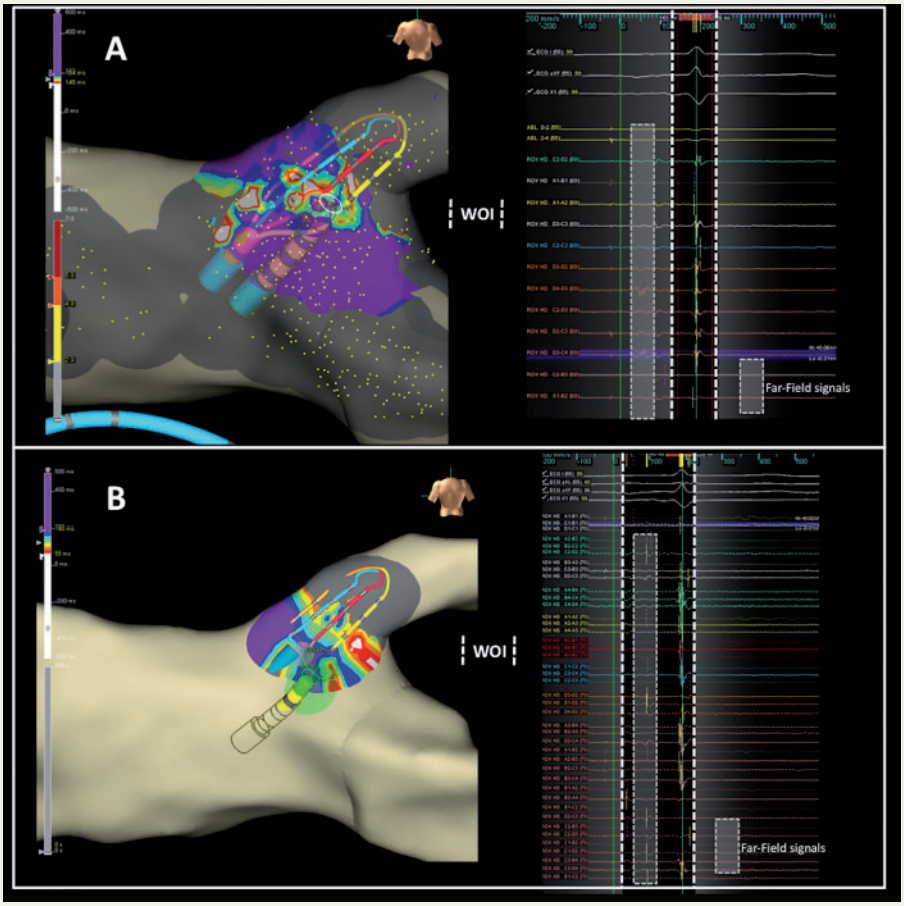

Figure 1 Pulmonary vein gap identification using automatic high-density mapping with (A) and without (B) blanking of the far-field signal.

A 59-year-old female patient underwent a second PVI procedure for recurrent paroxysmal AF. The current procedure was performed using Advisor HD Grid mapping catheter (Abbott, St Paul, MN, USA) to create a high-density contact map via the Ensite Precision 3D mapping system and a 4 mm radiofrequency irrigated catheter (Tacticath, Abbott, St Paul, MN, USA). The bipolar voltage map revealed a high-voltage area in the right superior PV, due to the presence of delayed PV potentials (*Figure 1*). In order to identify the gap responsible for the PV reconnection, a real-time activation map of the PV potential was performed using the LiveView module. During activation mapping, at many points it was observed an incorrect LAT annotation on the far-field signal of the left atrium. In order to correct this inaccurate annotation, the window of interest was modified by applying a blanking of the far-field signals, which allowed selective mapping of the delayed PV potential. Real-time activation mapping showed beat-to-beat the activation pattern of the PV. Automatic annotation without applying the blanking of the far-field signal suggested the location of the gap at the carina region of the right PVs (*Figure 1B*). Instead, the selective mapping of the local PV potential by modifying the window of interest located the gap at the posterior region of the right superior PV (*Figure 1A*). A single radiofrequency application at this point achieved

effective PV isolation. The use of the LiveView module also allowed to check the closure of the gap by showing in real time the entry blockage in the PV (Supplementary material online, *Video S1*).

Multielectrode mapping allows that multiple electrograms can simultaneously be acquired, leading to a rapid high-density mapping of atrial and PV activity and improving the precision of the procedure. Furthermore, real-time mapping allows beat-by-beat tracking of PV local potential, which could facilitate the identification of gaps more efficiently in PVI re-procedures. However, it has been reported that up to 43% of the gaps are not correctly localized due to inaccurate annotation of the LAT, either on far-field signals or electric noise.[3] Although these incorrect annotations can be manually corrected, it can be time consuming. This case proposes a method to avoid incorrect automatic annotation by applying a blanking of the far field signal modifying the window of interest.

Supplementary material

Supplementary material is available at *Europace* online.

Conflict of interest: none declared.

References

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