EP CASE REPORT

Atrial decremental evoked potentials accurately determine the critical isthmus of intra-atrial re-entrant tachycardia

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Background

We demonstrated the utility of Decremental Evoked Potential (DEEP) mapping in identifying critical isthmus in scar ventricular tachycardia (VT).[1] In substrate mapping, late potentials are usually targeted. This represents fixed delays in local conduction, which might not participate in tachycardia initiation. We mapped late signals which decremented, which could allow time for the blocked areas in the scar region to regain conductivity and initiate re-entry.

In sinus rhythm, a pacing train of 600 ms was delivered at late potential sites with an extrastimulus at VERP +20 ms interval. The site showing the maximum decrement was chosen as the ablation target. DEEP mapping was more specific in identifying critical targets of scar VT ablation compared to the conventional late potential mapping. We hypothesized that, as intra-atrial re-entrant tachycardia (IART) substrate is similar to scar VT by virtue of surgical scars, DEEP mapping could be useful in identifying critical targets for ablation.

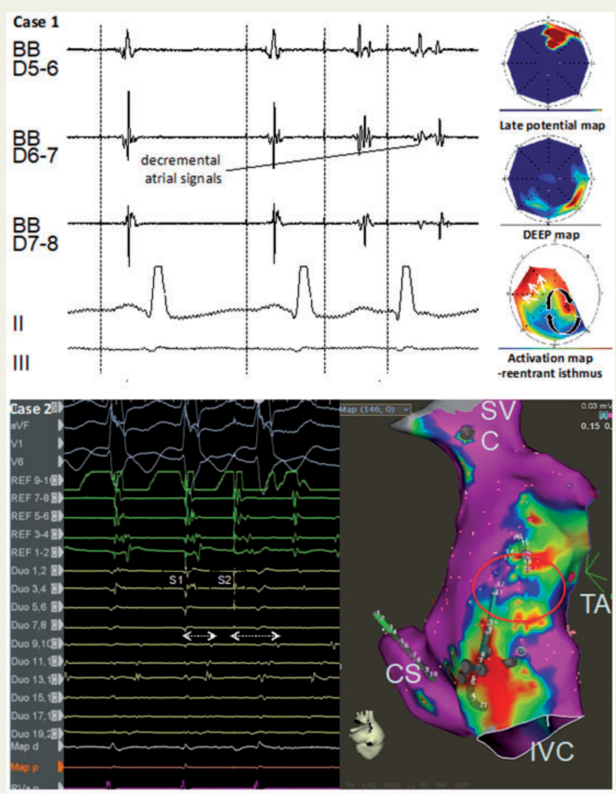

Figure 1 Case 1: Atrial DEEP mapping identified the critical isthmus-corresponded to the early site in activation map. Both were distant from the late potential map. Case 2: Atrial ablation was performed at the DEEP site-corresponded to the area in between scar areas in the voltage map. The patient remains free of arrhythmia after 5 years.

Objective

To assess the utility of DEEP mapping in identifying IART ablation targets.

Methods

Two patients with corrected transposition of great arteries (cc TGA) and previous cardiac surgery were selected for the study. Both had recurrent symptomatic IART prompting multiple hospital visits. A decapolar coronary sinus catheter was used for both patients. For the first patient, a 64-electrode basket array and for the second patient a duo-decapolar catheter was used for mapping. In sinus rhythm, extra-stimulus was introduced at the end of an atrial pacing train, and the decremental local potentials were annotated on the electro-anatomical map (CARTO, Biosense Webster, Israel).

Results

In both patients, DEEP mapping was useful in localizing the critical ablation targets (*Figure 1*) *Case 1*: In sinus rhythm, a pacing train was introduced from coronary sinus (CS) proximal electrode at 425 ms, and two extra stimuli were applied at 230 ms and 190 ms. Local potential decremented up to 60 ms, which was maximum in D7–8 electrode. This site was anatomically distant from the late potential map; however, it corresponded to early site in the activation map. The IART, which was initially inducible, was not inducible after ablation at the DEEP site. The patient remained arrhythmia free for 3 years after which redo ablation was done.

Case 2: IART could not be induced in this patient. In sinus rhythm, a pacing train was introduced from CS proximal electrode at 500 ms, and an extrastimulus was applied at 340 ms. Local potentials decremented up to 100 ms, which was maximum in the duo-decapolar electrode 10–11. This patient remains arrhythmia free since ablation for a follow-up of 5 years.

Conclusion

DEEP mapping was useful in localizing the critical ablation target in IART.

Conflict of interest: none declared.

Reference

1. Jackson N, Gizurarson S, Viswanathan K, King B, Massé S, Kusha M *et al*. Decrement evoked potential (DEEP) mapping: the basis of a mechanistic strategy for ventricular tachycardia ablation. *Circulation* 2015;**8**:1433–42.