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Case Report
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First Epicardial Sinus Node Mapping Using the Ultra High-Density Mapping Catheter Advisor™ HD Grid in Inappropriate Sinus Tachycardia

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Abstract

Inappropriate sinus tachycardia is a clinical syndrome, defined by fast sinus rates (>100 bpm at rest or >90 bpm on average over 24 h) associated with debilitating symptoms whose management by sinus node modification demonstrates only limited long-term success. We are presenting the first case of an epicardial and endocardial mapping of the sinus node area using the new ultra high-density 18-electrode mapping catheter AdvisorTM HD Grid (St. Jude Medical, Minneapolis, USA) in a patient with inappropriate sinus tachycardia.

Keywords: Catheter ablation; Epicardial and endocardial mapping; High-density mapping; Inappropriate sinus tachycardia; Sinus node modification

Introduction

Inappropriate sinus tachycardia is a syndrome characterized by an average sinus rate exceeding 90 bpm or a heart rate while awake and at rest ≥ 100 bpm and is associated with a spectrum of debilitating symptoms including palpitations, weakness, fatigue, dizziness, and near-syncope [1]. While inappropriate sinus tachycardia can occur in various populations, the typical patient is a young female [2]. In this report, we describe the first case of an epicardial and endocardial mapping of the sinus node area using the new ultra high-density 18-electrode mapping catheter Advisor™ HD Grid (St. Jude Medical, Minneapolis, USA) in a patient with inappropriate sinus tachycardia.

Case Presentation

A 58-year old woman presented with a longstanding history for medication-refractory inappropriate sinus tachycardia. The patient already underwent an endocardial sinus node ablation for inappropriate sinus tachycardia three times before, with subsequent implantation of a dual chamber pacemaker due to intermittent sinoatrial block. As the patient failed previous endocardial ablations and a temporary paresis of the right phrenic nerve was documented after the last endocardial ablation, an epicardial approach was chosen. Percutaneous pericardia access was obtained through a subxiphoid pericardial puncture. Earliest sinus activation site was mapped both from epicardial and endocardial and was located at the superior vena cava right atrium junction (Figure 1). Our case demonstrates that the HD Grid Mapping Catheter allows a safe, rapid and very detailed assessment of early activation sites in the sinus node area resulting in a successful combined epicardial and endocardial sinus node modification.

Discussion

Treatment of inappropriate sinus tachycardia is multifaceted and remains a substantial challenge. Managing patients with inadequate sinus tachycardia includes lifestyle modification, non-pharmacological and pharmacological interventions, and sinus node modification via radiofrequency ablation. However, many treatment recommendations for patients with inadequate sinus tachycardia have not been well tested. Thus, only small studies and several case reports have shown that the If blocker ivabradine can be useful to treat inadequate sinus tachycardia (Class IIa recommendation according to the Heart Rhythm Society Consensus document) [3,4]. Radiofrequency catheter ablation to modify sinus node has also been studied only in small populations [5,6]. However, a recent meta-analysis (9 studies), including 153 patients who failed to respond to maximum tolerated doses of pharmacological therapy, showed that sinus node modification was successful in the vast majority of patients [7]. The acute success rate was 88.9%, however, 8.5% of the

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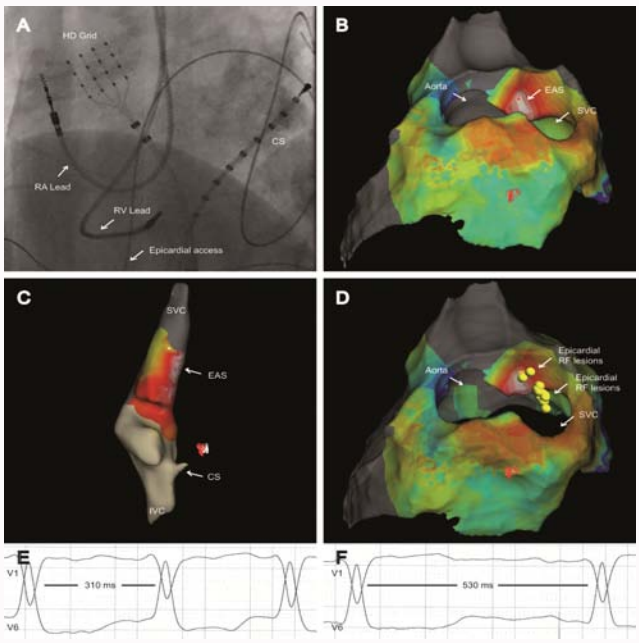

Figure 1: Panel A depicts the HD Grid Mapping Catheter in the right atrium. Panel B presents the created epicardial 3-D voltage map of the left atrium in a postero-anterior view. White color indicates the earliest activation site and purple color the latest one. Panel C shows the created endocardial 3-D voltage map in a left anterior oblique view. Electrocardiogram recording of inappropriate sinus tachycardia (Panel E) and sinus rhythm after successful radiofrequency ablation (Panel F).
CS: Coronary Sinus (catheter); EAS: Earliest Activation Site; IVC: Inferior Vena Cava; LAO: Left Anterior Oblique; RA: Right Atrial; RV: Right Ventricular; SVC: Superior Vena Cava

patients experienced severe procedural complications (pericarditis, diaphragmatic paralysis, arteriovenous fistula, retroperitoneal bleed) and 9.8% required pacemaker implantation. In addition, the overall frequency of recurrence within the designated study period was 19.6%. Furthermore, symptoms can even persist after successful sinus node ablation despite normalization in heart rate [8]. Accordingly, inadequate sinus tachycardia ablation is not recommended (Class III) as a routine intervention by the Heart Rhythm Society Expert Consensus Document [9].

Conclusion

High-density mapping helps to identify earliest activation sites during inadequate sinus tachycardia and may increase long-term success rate. However, as complications are fairly common and long-term follow-up shows a high recurrence rate, radiofrequency ablation is reserved for severe cases of inadequate sinus tachycardia where all other therapies failed.

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