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Case Report Open Access

# Catheter Ablation of Sinus Node Reentrant Tachycardia with a Non-Contact Mapping System

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**Abstract**

We describe a case of 47-year-old man who suffered a sinus node reentrant tachycardia and a typical counterclockwise cavotricuspid isthmus dependent atrial flutter. The dynamic isopotential mapping with non-contact mapping system showed that source and propagation sequence of the sinus node reentrant tachycardia almost identical to that of sinus rhythm, only the foremost was slightly different. The ablation on the source point terminated the tachycardia. The characteristics of the target electrogram in tachycardia were fractional and before onset of surface ECG P wave.

**Keywords:** Sinus node reentrant tachycardia; Non-contact mapping; Ablation

## Introduction

Sinus Node Reentrant Tachycardia (SNRT) is an uncommon arrhythmia, which is characterized by paroxysmal tachycardia with a "P" wave morphology and atrial activation sequence identical to sinus rhythm [1]. It can be induced or terminated by atrial programmed stimulation [1]. Catheter ablation is an option for the treatment. However the reports on catheter ablation of SNRT are very limited, and most of the previously reported procedures were performed by conventional activities or electroanatomic mapping. Here we report a successful ablation of SNRT using non-contact mapping system in a case concomitant with counterclockwise cavotricuspid isthmus dependent atrial flutter.

## Case Report

A 47-year-old male was referred to our hospital because of palpitation associated with fatigue for 5 years. 'Sinus tachycardia' or atrial flutter was diagnosed on several previous ECG recordings. He had been treated with several antiarrhythmic drugs such as β-blocker, propofenone and amiodarone with little effect. He had normal echocardiogram and chest X-ray examination.

During electrophysiological study, a 6Fr decapolar catheter (St. Jude Medical, MN, USA) was introduced into the coronary sinus (CS) via right jugular vein. Ensite array multi-electrode diagnostic catheter (St. Jude Medical, MN, USA) was positioned in the right atrium through right femoral vein. Incremental or programmed stimulation was made via CS electrodes. First a counterclockwise cavotricuspid isthmus dependent atrial flutter was induced and documented (Figure 1). A linear ablation transecting the cavotricuspid isthmus was performed with 4 mm open irrigation tip catheter under temperature-controlled mode (the maximum temperature 43°C, energy 35 w, the irrigated flow 17 ml/min). Bidirectional block was confirmed by dynamic isopotential map of Ensite array. Afterward a supraventricular tachycardia could be reproducibly induced and terminated by programmed atrial stimulation, suggesting that reentry was the underlying mechanism. Surface electrocardiogram showed that the "P" wave morphology of the tachycardia was identical to sinus rhythm. Dynamic isopotential mapping showed that source and propagation sequence of tachycardia almost identical to that of sinus rhythm, only the foremost was slightly different (Figure 2). These findings suggested the tachycardia was sinus node reentrant tachycardia.

Navigated by Ensite array system, the ablation catheter was approached to the source of tachycardia. At this site, the atrial electrocardiogram in tachycardia was 23 ms before onset of surface ECG P wave, and 52 ms in duration (Figure 3). After excluding phrenic nerve stimulation by high output (8 v, 1 ms) pacing using the ablation electrode, radiofrequency current was delivered up to 60 s in sinus rhythm under the same condition with the ablation of the typical atrial flutter. No more tarchycardia could be induced by programmed atrial stimulation, even with the presence of isoproterelol infusion. After operation, 24 hours telemetric ECG was monitored with no tachycardia identified.

SNRT has been increasingly diagnosed by electrophysiological study since it was considered as a theoretical cause of supraventricular

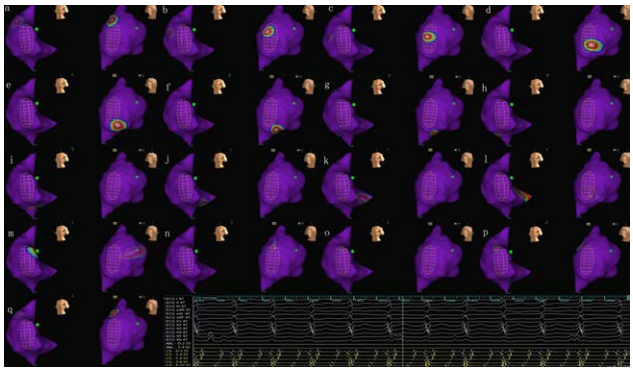

**Figure 1:** The dynamic isopotential map of counterclockwise cavotricuspid isthmus dependent atrial flutter. A cycle activation propagation was shown from a to q.

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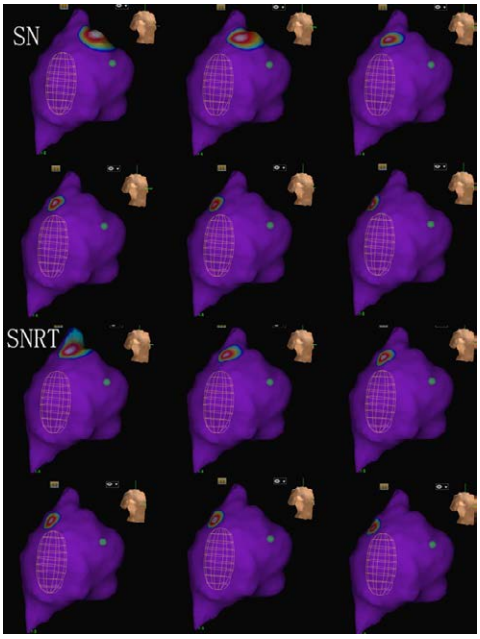


**Figure 2:** The difference of dynamic isopotential map between sinus rhythm and SNRT. Only the initiation of activation was not identical between SN and SNRT.

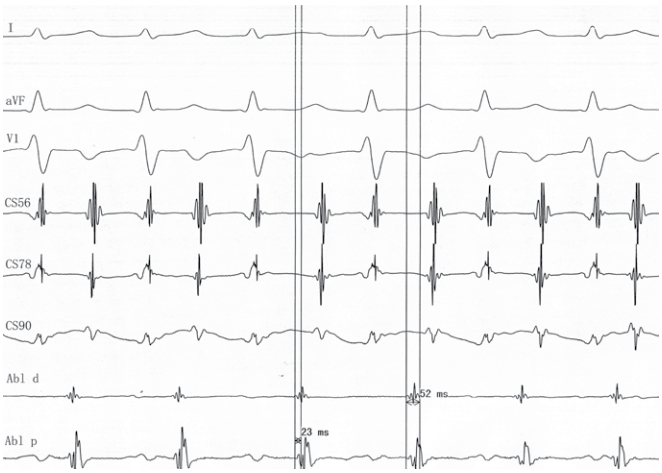


**Figure 3:** The targeted electrocardiogram of SNRT. The potential was 52 ms wide and 23 ms before the onset of surface P wave.

tachycardia by Baker et al. in 1943 [2]. It is often concomitant with other supraventricular tachycardia [1,3]. But the exact reentrant circuit is still unclear. Motoki H et al. found SNRT had the same sinoatrial exit pathways as sinus rhythm [4]. In this case, the SNRT was concomitant with cavotricuspid isthmus dependent atrial flutter. Using the noncontact electroanatomic map system, the source and propagation of the SNRT can be clearly documented, and found to be nearly identical to sinus rhythm. But there was a hairlike diversity in the initial. That indicated the reentrant circuit maybe involve the surrounding atrium of sinus node.

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