

Inappropriate Sinus Tachycardia Diagnosed and Treated as Depression Successfully Treated by Radiofrequency Catheter Ablation

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Abstract

We experienced a man in his 20s with inappropriate sinus tachycardia (IST) initially diagnosed and treated as depression who was steadily treated with radiofrequency catheter ablation (RFCA) using an EnSite™ system. The patient has remained well without any symptoms or medications, including antidepressants, for two years since the RFCA. To avoid missing IST and treating it as an emotional problem and/or mental illness such as depression, physicians - including cardiologists - should be aware of these conditions when examining patients with multiple and incapacitating complaints including palpitations and general fatigue and/or tachycardia, especially characterized by an elevated resting heart rate or a disproportionate increase in the heart rate with minimal exertion.

Key words: inappropriate sinus tachycardia, EnSite, radiofrequency catheter ablation, depression

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Introduction

Inappropriate sinus tachycardia (IST) is an uncommon clinical and pathological syndrome that is characterized by an elevated resting heart rate or disproportionate increase in the rate with minimal exertion (1, 2). Because not only many physicians but also some cardiologists do not recognize IST, it is sometimes misdiagnosed as an unpathological sinus tachycardia, emotional problem, and/or mental illness, such as depression (1). Indeed, we have experienced two patients with IST diagnosed and treated as an emotional disorder or depression. Radiofrequency catheter ablation (RFCA) is an acceptable treatment modality for drug-refractory IST (1-5). We herein report a case of IST successfully treated by RFCA in a patient in whom the IST had been initially diagnosed and treated as depression.

Case Report

A man in his 20s presented to our hospital with a chief complaint of palpitations, dizziness, weakness, easy fatigability, and general fatigue. He was diagnosed with depression by his previous doctor, and antidepressants were prescribed for 14 months. His symptoms had not changed before or after the treatment with antidepressants. His physical examination, laboratory analysis, chest X-ray, and echocardiograms, yielded no evidence of clinically overt structural and/or organic heart disease, or a secondary pathological sinus tachycardia, such as anemia or hyperthyroidism. His P-wave axis during the tachycardia was similar to that during sinus rhythm, and tall P-waves were noted during the tachycardia, especially in leads II, III, and aVF (Fig. 1A and B) on the 12-lead electrocardiogram. His heart rate (HR) was greater than 100 beats per minute (bpm) with minimal exertion (Fig. 1B), the 24-h Holter monitoring demonstrated a

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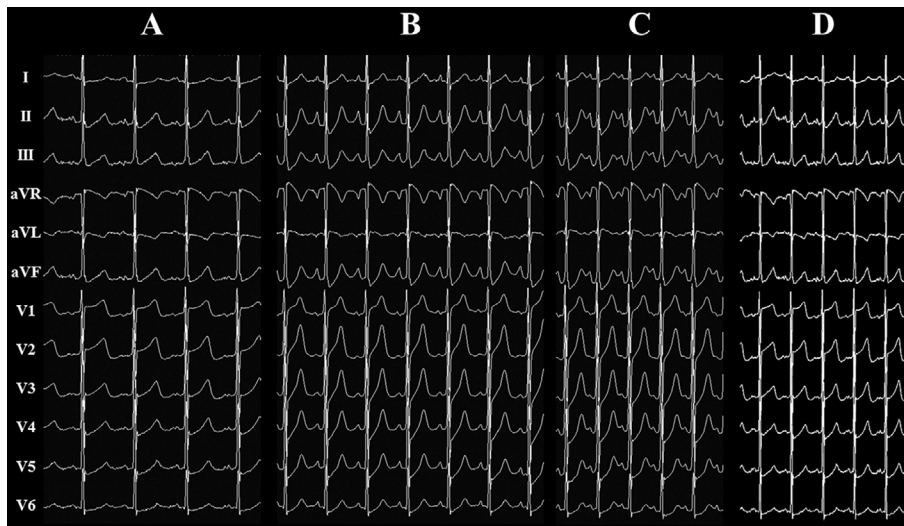


Figure 1. A 12-lead electrocardiogram at rest (heart rate 90 bpm) (A), on minimal exertion (heart rate 120 bpm) (B), under intravenous administration of a beta-adrenergic agonist (heart rate 150 bpm) (C), and after delivering radiofrequency energy (heart rate 130 bpm) (D). bpm: beats per minute

Table. HR, Treadmill Test, BNP, and NYHA Functional Class.

	Before RFCA	After RFCA
Total heart beat (beats per day)	141,144	112,322
Average HR by 24-h Holter monitoring (bpm)	98	78
Time-HR>130 bpm (seconds)	78	158
ST-T change	none	none
Serum BNP (pg/dL)	34	8
NYHA functional class	II	I

HR: heart rate, bpm; beats per minute, BNP: brain natriuretic peptide, NYHA: New York Heart Association, RFCA: radiofrequency catheter ablation, Time-HR>130 bpm: heart rate of greater than 130 bpm during a standard Bruce protocol on the treadmill test

mean HR of greater than 90 bpm with palpitations, and he exhibited an HR of greater than 130 bpm within the first 90 seconds of a standard Bruce protocol on the treadmill test (Table). Given the above, he was diagnosed with IST.

His serum brain natriuretic peptide (BNP) concentration was elevated at 34 pg/dL, and his New York Heart Association (NYHA) functional class was class II on admission (Table). His IST was therefore deemed drug refractory, including to an oral administration of the beta-adrenergic blockers bisoprolol 5 mg/d and verapamil 120 mg/d.

RFCA was performed guided by a multielectrode array catheter using the EnSite™ non-contact mapping system. An electrophysiological study was performed before and after the RFCA to verify the mechanism of the arrhythmia and to exclude the coexistence of other arrhythmias. Using a beta-adrenergic blocker and agonist, the heart rate was controlled between 80 and 150 bpm before and after the RFCA. IST with tall P-waves during the tachycardia in leads II, III, and aVF was steadily induced by a beta-adrenergic agonist (Fig. 1C). Warm-up at the initiation and cool-down at the termination of the IST were observed under intravenous administration of a beta-adrenergic blocker and agonist, respectively. The activation maps from the EnSite™ images

interestingly demonstrated that the breakout sites (BOSs) for HR of less or more than 100 bpm could easily and clearly be separated (Fig. 2A and C). After delivering radiofrequency energy for 30 to 60 seconds with a preset temperature of 50°C and power limit of 30 W at the BOSs during an HR of more than 100 bpm, the BOSs observed during an HR of more than 100 bpm completely moved to the sites for an HR of less than 100 bpm (Fig. 2B and C), in accordance with the disappearance of the tall P-waves in leads II, III, and aVF (Fig. 1D).

After treating the IST, his incapacitating symptoms steadily disappeared. His 24-h Holter monitoring and standard Bruce protocol on the treadmill test demonstrated a mean HR of less than 90 bpm without any symptoms and an HR of greater than 130 bpm over the first 90 seconds (Table). His serum BNP concentration and NYHA functional class normalized to 8 pg/dL and class I, respectively (Table). He has remained well without any symptoms or medications, including antidepressants, for two years since the RFCA.

Discussion

Although any relationship with IST is uncertain, associ-

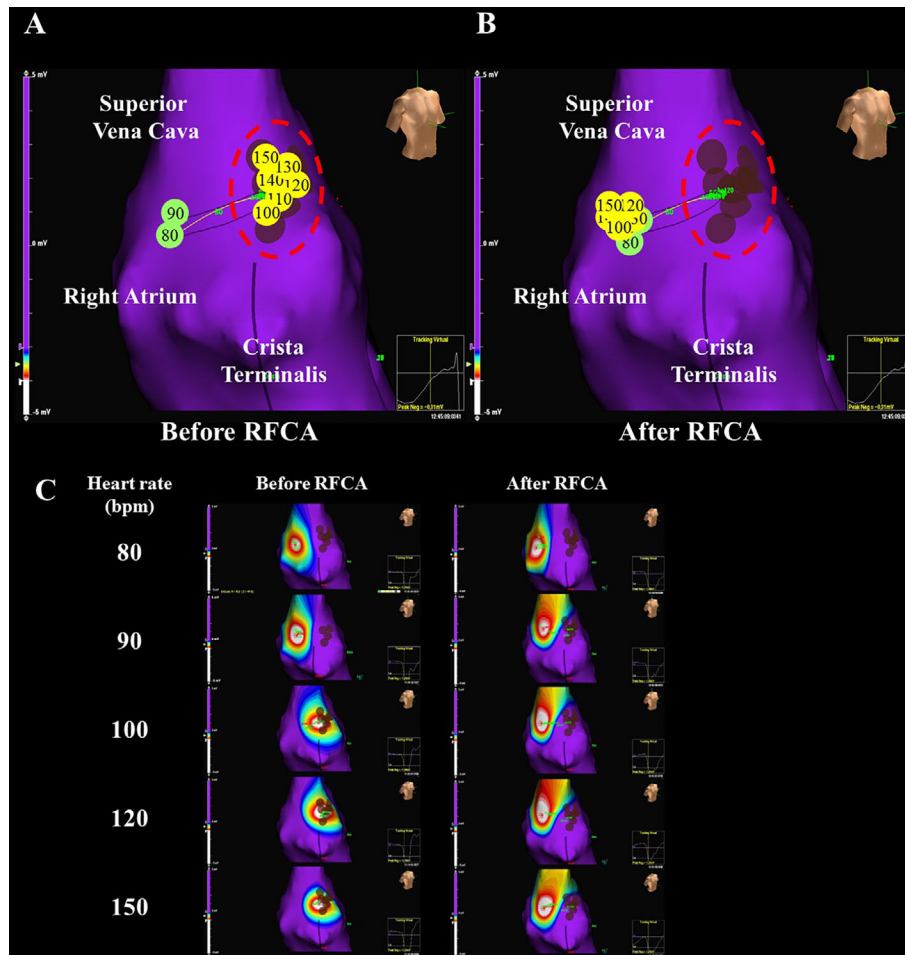


Figure 2. Right anterior oblique view of the EnSite™ voltage (A, B) and activation (C) maps showing the right atrium (RA). The breakout sites (BOSs) with a heart rate (HR) of less (green circle with 80 and 90) or more (yellow circle with 100, 110, 120, 130, 140, and 150) than 100 bpm could easily and clearly be separated (A, C). The area in the red circle with the dotted line was the target site for the radiofrequency catheter ablation (RFCA) (A, B). After the RFCA, the BOSs observed during an HR of more than 100 bpm (yellow circles with 100, 110, 120, 130, 140, and 150) completely moved to the sites for an HR of less than 100 bpm (green circles with 80 and 90) (B, C). bpm: beats per minute

ated emotional and psychiatric problems are often noted in patients with tachycardia (2), causing the IST to be misdiagnosed as an emotional problem or mental illness such as depression, as in the present case. Because the symptoms associated with those emotional and psychiatric problems sometimes resemble those associated with IST, IST can be difficult to diagnose accurately even by seasoned physicians, including cardiologists. Indeed, it has been reported that 100% of patients with IST had initially received some psychiatric diagnosis, such as depression, panic disorder, schizophrenia, or somatoform disorder (1). We may have been able to accurately diagnose IST in the present case because we've had experience diagnosing and treating such patients before. It may therefore be important to consult an expert on patients with those symptoms, especially when faced with laboratory findings of tall P-waves during the tachycardia, particularly in leads II, III, and aVF on the 12-lead electrocardiogram, an HR of greater than 100 bpm on minimal exertion, and/or

a mean HR of greater than 90 bpm with palpitations of the 24-h Holter monitoring.

RFCA is reported to be an acceptable treatment modality for IST (1-5). Because this patient was young and his IST was drug-refractory, we ultimately decided to perform RFCA using EnSite™ (5) after informed consent was obtained. As a result, his clinical status improved (Table), and an acceptable long-term clinical outcome was achieved. The symptoms associated with certain emotional and psychiatric problems can sometimes resemble those associated with IST. Furthermore, the symptoms associated with IST are especially characterized by an elevated resting heart rate or a disproportionate increase in the heart rate with minimal exertion. To avoid missing IST and treating it as an emotional problem and/or mental illness such as depression, physicians - including cardiologists - should be aware of these conditions when examining patients with multiple and incapacitating complaints including palpitations and general fatigue

and/or tachycardia.

The authors state that they have no Conflict of Interest (COI).

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