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## Headache and sick sinus syndrome: A case report

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### Abstract

#### BACKGROUND

Sick sinus syndrome is a common disease in cardiology. Typical symptoms include palpitations, dizziness, shortness of breath, chest tightness, and amaurosis. However, to date, there are no known reports of sick sinus syndrome presenting with headache. Whether there is a correlation between headache and sick sinus syndrome merits further research. In this report, we describe a case of headache induced by sick sinus syndrome.

#### CASE SUMMARY

A 73-year-old female patient presented to our department with the chief complaint of recurrent paroxysmal headache for more than 7 years. The patient described paroxysmal palpitations, usually headache occurring after palpitation. Her blood pressure was normal when the most recent headache occurred. A magnetic resonance imaging study and magnetic resonance angiography of the head at another center were normal. A clinical neurological examination was negative. A 24-h Holter electrocardiogram monitoring study showed sick sinus syndrome. The patient received dual chamber pacing implantation and was administered drug therapy to control ventricular rate. The patient's paroxysmal headaches and palpitations had resolved within 1 year, confirmed *via* a follow-up telephone call.

#### CONCLUSION

After dual-chamber pacing implantation and drug therapy administration to control the ventricular rate, the patient's paroxysmal headaches and palpitations had resolved within 1 year, confirmed *via* a follow-up telephone call. We believe that the headaches were related to the patient's sick sinus syndrome.

**Key words:** Headache; Palpitations; Sick sinus syndrome; Differential diagnosis; Case report; Electrocardiogram

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**Core tip:** We report a patient who had headaches induced by sick sinus syndrome. To the best of our knowledge, this finding has not been previously reported. It provides new ideas for clinical diagnosis and treatment of both headache and sick sinus syndrome in the future.

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## INTRODUCTION

Headache is a common neurological symptom with a multitude of different causes such as intracranial hemorrhage, infection, and migraine. Sick sinus syndrome is an arrhythmia phenotype attributed to sinus node dysfunction. The clinical symptoms of sick sinus syndrome include palpitations, dizziness, chest tightness, weakness, shortness of breath, amaurosis, and Adams-Stokes syndrome, among others. In this report, we describe a case of headache induced by sick sinus syndrome.

## CASE PRESENTATION

### Chief complaints

On July 30, 2018, a 73-year-old female patient presented to our department with the chief complaint of recurrent paroxysmal headache for more than 7 years.

### History of present illness

The headaches lasted from minutes to hours, and presented with moderate swelling and recurrent paroxysmal pain through the whole brain. The patient had paroxysmal palpitations as well, usually followed by the headache episodes. However, headaches did not always occur every time after palpitations. The patient's blood pressure was normal when the headaches occurred.

### History of past illness

The patient has documented hypertension and type 2 diabetes, although blood pressure and glucose were well managed.

### Personal and family history

The patient's family history was unremarkable.

### Physical examination

The patient's heart auscultation was absolutely arrhythmic, heart sound intensities differed, and her pulse was deficient. Her blood pressure was 132/75 mmHg. The clinical neurological examination was negative.

### Laboratory examinations

The patient's thyroid function was normal. The liver and kidney function examination was also negative.

### Imaging examinations

A magnetic resonance imaging study and magnetic resonance angiography of the head performed at another center were normal (Figure 1).

### Electrocardiogram findings

The 24-h Holter electrocardiogram (ECG) monitoring study showed sinus bradycardia, sinus pause, AV junctional escape beats, ventricular escape, paroxysmal atrial flutter, and paroxysmal atrial fibrillation. The longest RR interval was 5.952 s (Figure 2).

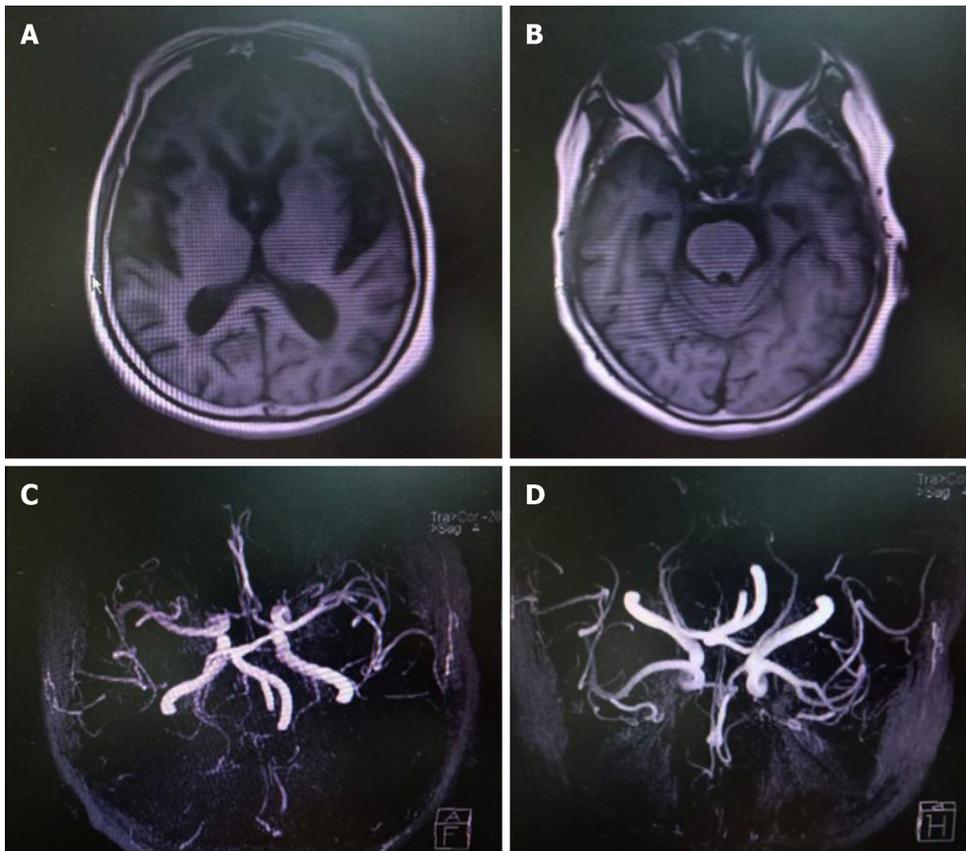


Figure 1 Magnetic resonance imaging and magnetic resonance angiography findings in the patient.

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## FINAL DIAGNOSIS

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We arrived at a final diagnosis of sick sinus syndrome.

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## TREATMENT

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The patient received dual-chamber pacing implantation on August 6, 2018. The patient was prescribed Metoprolol Succinate Sustained-Release Tablets 47.5 mg twice a day and Amiodarone Hydrochloride Tablets once a day to control ventricular rate.

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## OUTCOME AND FOLLOW-UP

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The patient's paroxysmal headaches and palpitations had resolved within 1 year, confirmed by a follow-up telephone call. The ECG was normal after implantation of dual-chamber pacing (Figure 3).

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## DISCUSSION

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In this case, the organic lesion had not been considered when auxiliary examinations and a clinical neurological examination were both negative. Migraine was not considered on account of the patient's age. When the patient described headaches following palpitations, we hypothesized that the headaches may have been related to an arrhythmia. After dual-chamber pacing implantation and pharmaceutical anti-arrhythmic therapy, the patient was followed up *via* a telephone call at 1 year. At that time, the patient reported resolution of her symptoms. Therefore, we believe that her headaches were related to sick sinus syndrome.

Common mechanisms of headache include: (1) Constriction, dilatation and extension of intracranial blood vessels caused by various pathologies; (2) Cranial and cervical nerve stimulation; (3) Elevated resting tension of the head and neck muscles; (4) Ophthalmologic and otorhinolaryngologic disorders, and cervical spine disease;

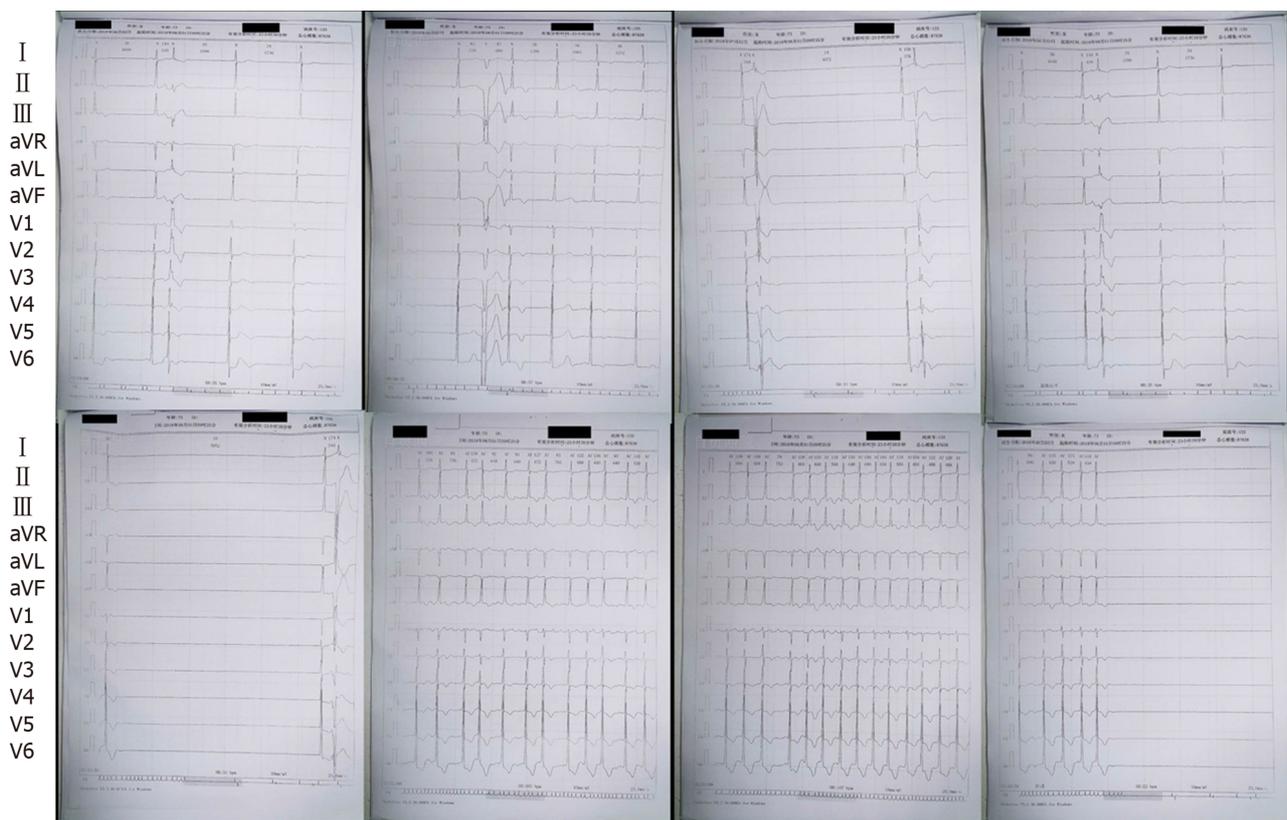


Figure 2 Twenty-four-hour Holter electrocardiogram monitoring results.

(5) Biochemical factors and endocrine disorders; and (6) Neurological disorders.

The incidence of headache as a symptom of sick sinus syndrome was not definite. No similar report was found in the literature.

Asvestas *et al*<sup>[1]</sup> reported a case of headache as a primary symptom of acute myocardial infarction. Huang *et al*<sup>[2]</sup> reported a similar case of a patient, who had been diagnosed with myocardial infarction and complained of headache without chest discomfort. Furthermore there have been multiple case reports of headache as the sole or cardinal symptom of myocardial infarction<sup>[3-6]</sup>. Thus, the concept of headache being induced by cardiac factors has been presented.

Cardiac cephalgia is defined in The International Classification of Headache Disorders: 2<sup>nd</sup> edition<sup>[7]</sup> and The International Classification of Headache Disorders: 3<sup>rd</sup> edition<sup>[8,9]</sup>.

There are four theories regarding the proposed pathogenesis of cardiac cephalgia. First, the heart is mediated by the autonomic nerve, visceral, and somatic fibers, which can converge on the same neurons in the spinal cord. Then the information induced by visceral afferents is relayed to the higher somatic region. Second, the reduction of cardiac output elevates left ventricular and right atrial pressure, which decreases cerebral venous refluxing and elevates intracranial pressure<sup>[10,11]</sup>. Third, neurochemical mediators produced by myocardial ischemia can induce vasodilatation of the cerebral vessels and pain<sup>[10,11]</sup>. Fourth, it is assumed that vasospasms can concomitantly occur in both coronary and cerebral vessels<sup>[10,12]</sup>.

In this case, we hypothesized that arrhythmia led to myocardial ischemic and reduction of cardiac output. As a result of the arrhythmias, headache could be induced by stimulating visceral nerves and neurochemical mediators because of myocardial ischemia, and could also be induced by elevated intracranial pressure because of the reduction of cardiac output. Unfortunately, we did not monitor the variation of this patient's cardiac output; thus, the possibility of other causes remains to be considered.

## CONCLUSION

This case provides two novel insights. First, clinicians should pay close attention to predisposing symptoms and conditions. Second, it appears that arrhythmias can cause headaches.

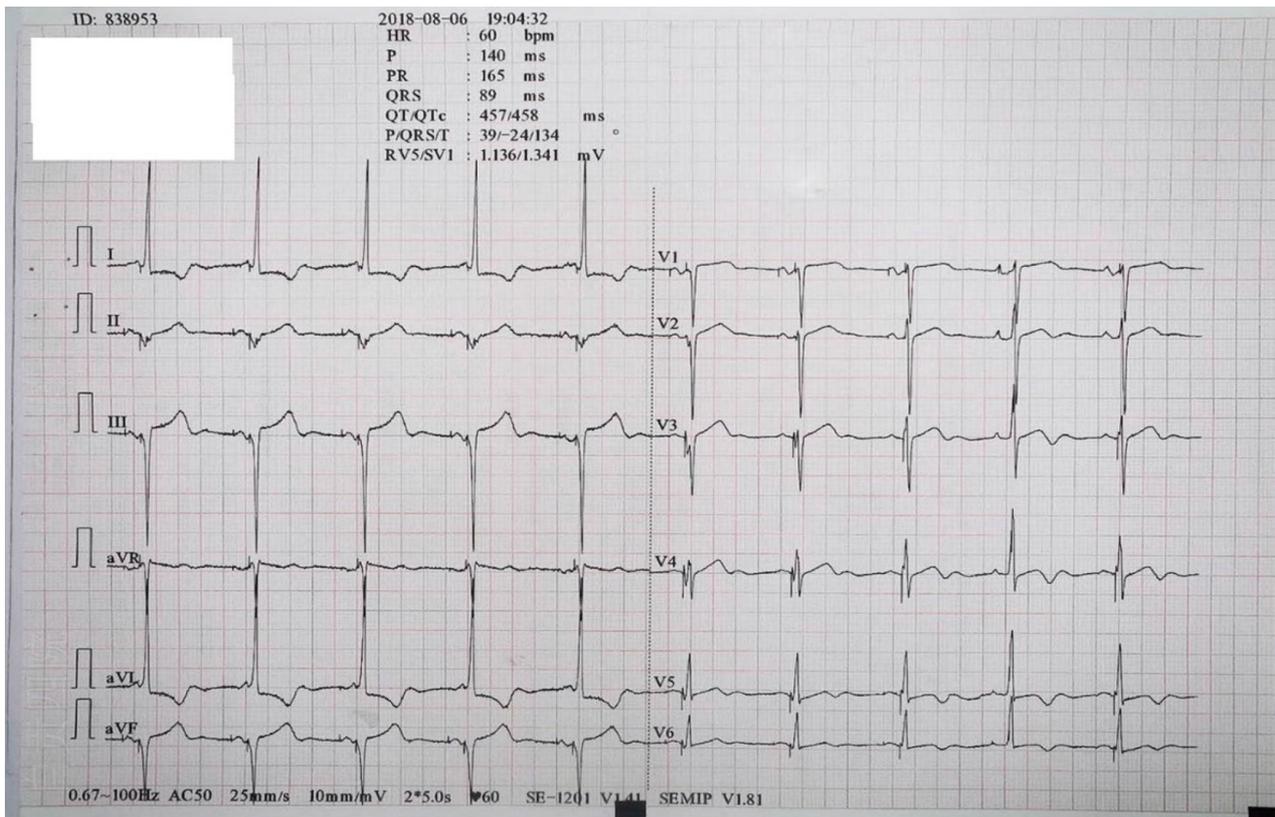


Figure 3 Electrocardiogram after implantation of dual-chamber pacing.

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