

[CASE REPORT]

Pregnancy May Affect the Attenuation of an ST Segment Elevation in the Right Precordial Leads: A Female Patient with Brugada Syndrome

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Abstract:

A 30-year-old woman was referred to our hospital to undergo an evaluation for suspected Brugada syndrome. She showed no symptoms, but had a strong family history of sudden cardiac death. During observation, Holter electrocardiography (ECG), which had been performed to investigate her symptoms of occasional dizziness, showed a sinus node dysfunction with an occasional long sinus pause. An implantable cardioverter defibrillator (ICD) was therefore put in place, and bradycardia pacing from the ICD relieved those symptoms during the subsequent 18-month follow-up. The patient completed two pregnancies during the follow-up period. No symptomatic changes occurred during the pregnancies, but ECG indicated that an ST segment elevation in the right precordial leads was attenuated during the second and third trimesters of both pregnancies.

Key words: Brugada syndrome, female hormone, pregnancy, sinus node dysfunction

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Introduction

Brugada syndrome (BrS) is approximately nine times more prevalent in males than in females, which may be explained by the higher testosterone levels in males. Among the various parameters used to stratify the risk of sudden cardiac death in BrS, spontaneous electrocardiographic (ECG) changes in the right precordial leads are considered to be important risk factors for arrhythmic events in BrS and they may account for the associated symptoms. We treated a 30-year-old female patient with BrS who had a strong family history of sudden cardiac death and symptomatic sinus node dysfunction which necessitated bradycardia pacing from an implantable cardioverter defibrillator (ICD). We found electrocardiographic changes in the attenuation of an ST segment elevation in the right precordial leads during the second and third trimesters of pregnancy, which indicated that estrogen and progesterone may play a cardioprotective role in BrS.

Case Report

During a medical examination, a 30-year-old woman was diagnosed to have BrS on ECG in which the right precordial leads indicated an obvious coved-type ST segment elevation (Fig. 1A and B). The patient was referred to our hospital for evaluation and treatment. At the initial examination, she reported no previous episodes of palpitations, faintness, or syncope, and the physical examination showed no abnormalities. However, she had a strong family history of sudden cardiac death; her father had symptomatic BrS and had undergone ICD placement for secondary prevention. Signal-averaged ECG gave positive findings in both atria and both ventricles (Fig. 1C and D). Despite ECG findings indicative of BrS, she had no symptoms; therefore, she was carefully observed at the outpatient clinic of our hospital. During follow-up, Holter ECG was performed because she reported occasional fainting spells and dizziness, and showed sinus node dysfunction (maximal RR interval, 4.34 seconds) was

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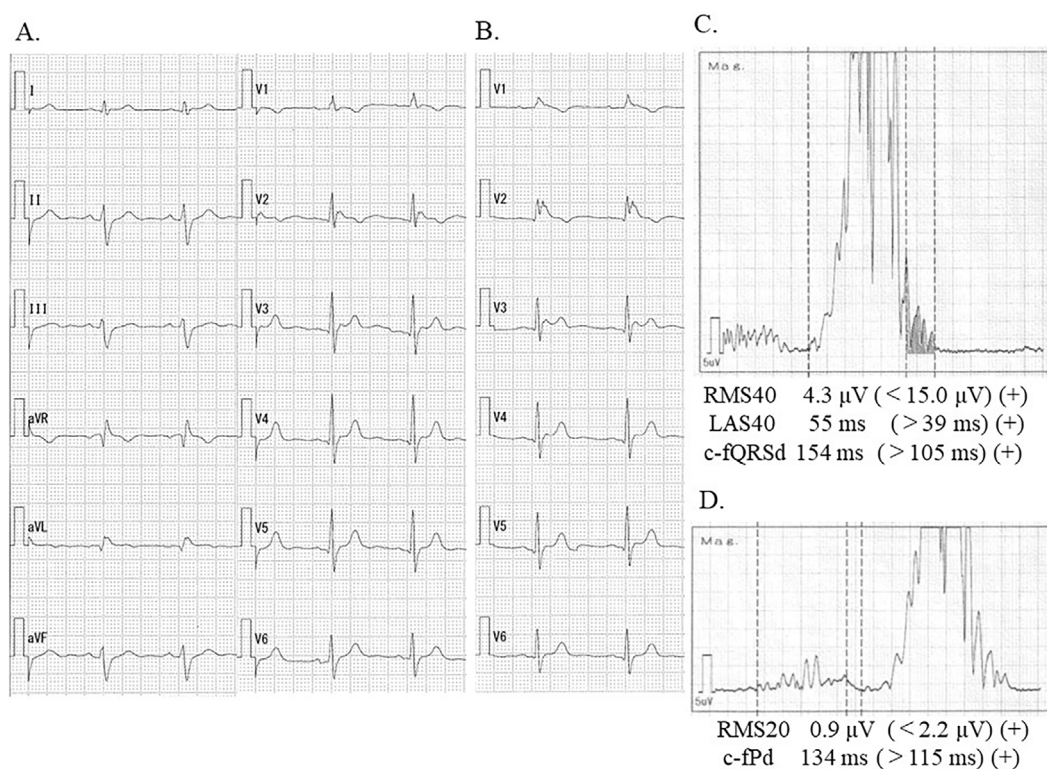


Figure 1. (A) On 12-lead electrocardiography (ECG) at the patient's first visit to our hospital, the V2 lead showed a coved-type ST segment elevation, while the V3 lead showed a slight saddleback ST segment elevation. (B) ECG findings in the precordial leads recorded from one intercostal space (ICS) above the usual position in the same examination as A. An obvious coved-type ST segment elevation in the right precordial leads at one (upper third) ICS was recorded. (C and D) Signal-averaged ECG was recorded from ventricle (C) and atrium (D), respectively. Both late potentials were clearly positive during the patient's first visit to our hospital. c-fPd, filtered P wave duration; c-fQRSd, filtered QRS interval duration; LAS40, low-amplitude signal duration under 40 mV; RMS20 and RMS40, root mean square voltages of the last 20 and 40 ms of the QRS complex, respectively.

observed with frequent episodes of sinus arrest associated with dizziness (Fig. 2A). Cilostazol was prescribed to treat the sinus node dysfunction, and the symptoms, including dizziness, improved slightly. However, the sinus node dysfunction did not improve sufficiently, and therefore an ICD was placed (Fig. 2B). After ICD implantation, the patient's symptoms, such as dizziness, were successfully relieved, and no problems were reported during the 18-month follow-up. She completed two pregnancies during the follow-up period, with no symptomatic changes occurred during that time. Furthermore, the ST segment elevations in the right precordial leads were attenuated during the second and third trimesters of pregnancy, in comparison to the periods when she was not pregnant (Fig. 3).

Discussion

BrS is an inherited arrhythmic syndrome, usually without any obvious structural heart disease. Berthome et al. (1) reported that in comparison to male patients with BrS, several female patients with BrS had no symptoms and were therefore at lower risk for sudden death, and spontaneous ST segment changes in the ECG pattern also occurred less fre-

quently. Because of these characteristics, the clinical features of BrS in female patients are therefore difficult to understand. At the time of the first related event, affected the females were significantly older than the affected males (49 vs. 43 years, respectively). Aizawa et al. (2) reported cases of familial BrS wherein 10 of the 12 affected female patients developed sick sinus syndrome, while the male patients did not. Of the seven affected families, five underwent genetic testing, and *SCN5A* mutations were detected in all five. Sudden death or spontaneous ventricular fibrillation occurred in 2 of the 12 female patients. Based on these findings, because our patient was at risk for sick sinus syndrome, as well as for sudden onset of lethal ventricular arrhythmias, an ICD was therefore put in place. No genetic analysis was performed due to the patient's request.

Few investigators have studied BrS and pregnancy, and only two case reports of pregnancy with BrS are currently available (3, 4). In the first report (3), a 22-year-old woman with BrS presented at 12 weeks of pregnancy with cardiac electrical storm; in the second (4), a 20-year-old woman with BrS had an uneventful pregnancy. Our case was similar to the latter one, inasmuch as she had uneventful pregnancies, however, although the possibility of spontaneous ECG

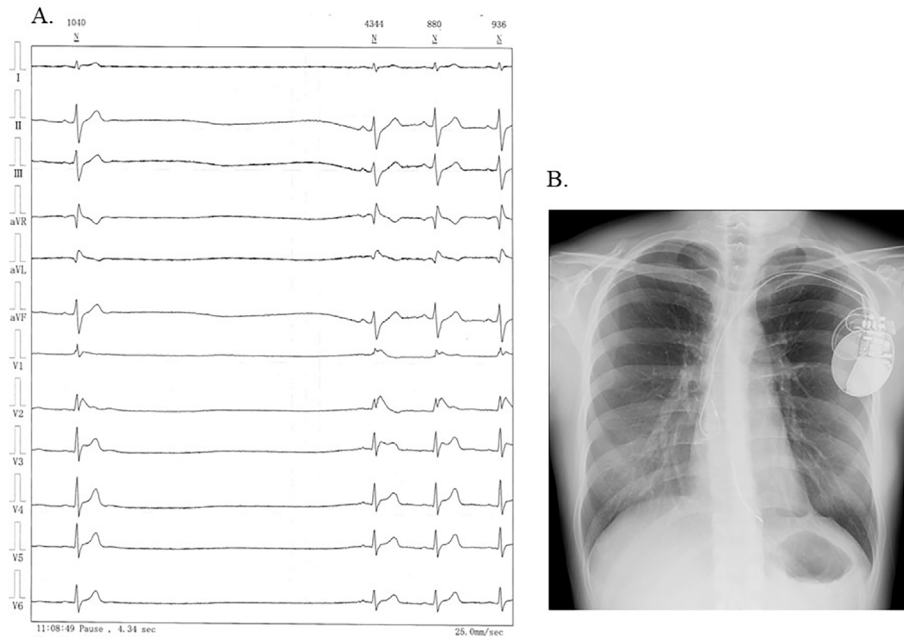


Figure 2. (A) Twelve-lead Holter electrocardiography showed sinus arrest (4.34 seconds) at 11:00 AM. An abrupt long pause due to sinus arrest was immediately followed by an augmented ST segment elevation in the right precordial leads. (B) A chest radiograph after the placement of an implantable cardioverter defibrillator, with a cardiothoracic ratio of 40.8%.

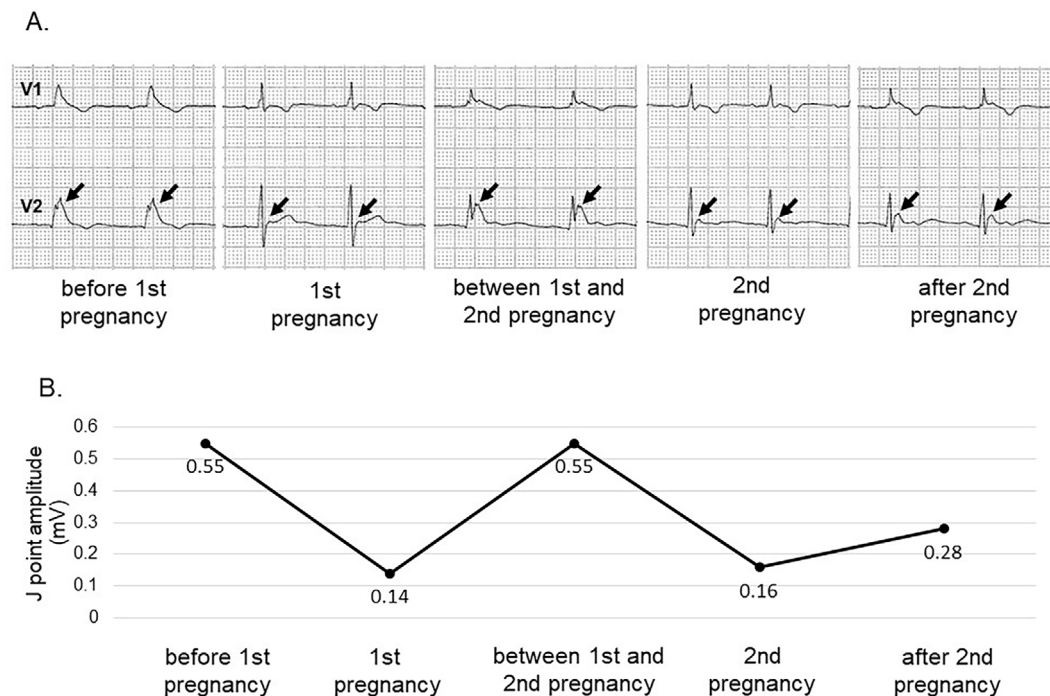


Figure 3. (A) Five electrocardiograms (ECGs, leads V1 and V2) recorded at different times from the third intercostal space (ICS) during serial periods of nonpregnancy and pregnancy. ECGs were recorded during the 38th week of the first pregnancy and during the 21st week of the second pregnancy. (B) Changes in the value of J-point amplitudes in lead V2 (third ICS) during the same periods as the ECG recordings in part A. The J-point amplitudes decreased during pregnancy, but not during the nonpregnancy periods.

changes in the natural course could not be rule out, we found an attenuation of the ST segment elevation in the right precordial leads during both her pregnancies (at 38 weeks in the first pregnancy and at 21 weeks in the second pregnancy). These discrepancies, with or without the occurrence of lethal arrhythmia, may be explained as follows: Ac-

According to Tisdale et al. (5), estrogen plays a role in potassium channel inhibition, and progesterone protects the prolongation of the action potentials. Thus, estrogen and progesterone exert combined antiarrhythmic effects in BrS. Moreover, the levels of these female hormones dramatically increase during the second and third trimesters of pregnancy, in comparison with the first trimester. Further studies are therefore needed to clarify these observations.

Conclusion

A young female patient with BrS and sinus node dysfunction required an ICD for bradycardia pacing. The attenuation of an ST segment elevation in the right precordial leads was observed during pregnancy, probably because of higher levels of female hormones, including estrogen and progesterone, particularly during the second and third trimesters of pregnancy.

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

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