

CLINICAL STUDY

Aborted sudden cardiac death in patient with concealed Brugada syndrome early after skin tattoo

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ABSTRACT

We report a case of 40-year-old healthy patient presented with aborted sudden cardiac death. Echocardiography and coronarography were normal. ECG showed minimal non-specific changes in right precordial leads. A concealed Brugada syndrome was considered. We performed a provocative ajmaline test with Brugada-specific lead placement in 2nd, 3rd and 4th intercostal spaces at both parasternal sides. The test has confirmed the supposed diagnose.

Detailed history taking revealed that the patient underwent a calf tattoo procedure on the same day. In this case report, we describe a new mechanism in Brugada patients, possibly leading to sudden cardiac death. The skin tattoo procedure is in more than 7 % of cases accompanied with a “tattoo flu syndrome”, manifesting with fever, headache and fatigue. The fever is well described as a provoking factor for malignant arrhythmias in Brugada patients. Thus, a simple and safe procedure like skin tattoo can potentially lead to death in concealed Brugada syndrome population (Fig. 7, Ref. 9). Text in PDF www.elis.sk

KEY WORDS: radical gastrectomy, D2 lymph node dissection, neoadjuvant therapy.

Introduction

Brugada syndrome (BrS) is an inherited disorder associated with the risk of ventricular fibrillation and sudden cardiac death in a structurally normal heart. The diagnosis is based on a characteristic electrocardiographic pattern in the right precordial leads observed either spontaneously or during a sodium-channel blocker test.

The disease was described by Brugada brothers in 1992 (1), but many Southeast Asian ethnic groups have known a sudden nocturnal death disease many years before under local names (e.g., Lai Tai in Thailand, Pokkuri in Japan, Bangungut in Philippines, Dream Disease in Hawaii) (2).

Symptoms typically first occur during adulthood, with mean age of 41 ± 15 years at SCD presentation (3). Lethal arrhythmias usually occur during resting, sleeping, or eating, suggesting an association with bradycardia or vagal events. Febrile episodes have also been frequently associated with symptoms (4).

We present a unique case report of a patient with concealed BrS after aborted sudden cardiac death early after undergoing a

skin tattoo procedure, where fever induced by tattoo ink injection could play the crucial role.

Case report

A 40-year-old male (BMI 31 kg/m², non-smoker) had presented in the evening hours with sudden syncope with apnoea while sitting on a chair; his wife started immediate resuscitation. The initial ECG recorded by emergency crew was ventricular fibrillation. Several shocks were needed to restore the sinus rhythm with return of spontaneous circulation (ROSC). On the first 12-lead ECG after ROSC, the sinus rhythm with “right bundle branch block pattern” was present (Fig. 1). The patient was admitted to the Department of Arrhythmology of the National Cardiovascular Institute in Bratislava.

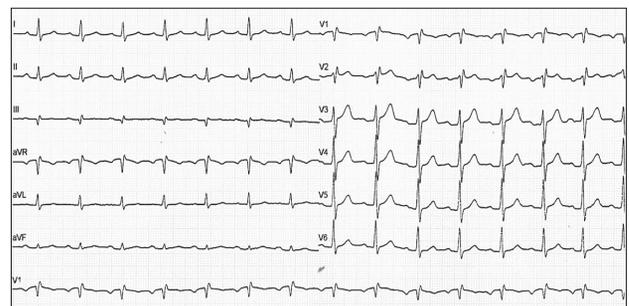


Fig. 1. Initial ECG after the shocks. The right bundle branch block (RBBB) pattern is present in leads V1-2, concealed Brugada syndrome is supposed.

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Fig. 2. Skin tattoo in the calf region was probably the cause of malignant arrhythmia.

Detailed history taking and physical examination revealed that the patient underwent a calf skin tattoo procedure in the morning of the same day (Fig. 2).

Echocardiography and selective coronarography excluded any structural heart disease. We assumed a concealed Brugada syndrome. We performed a sodium channel blocker test (ajmaline),

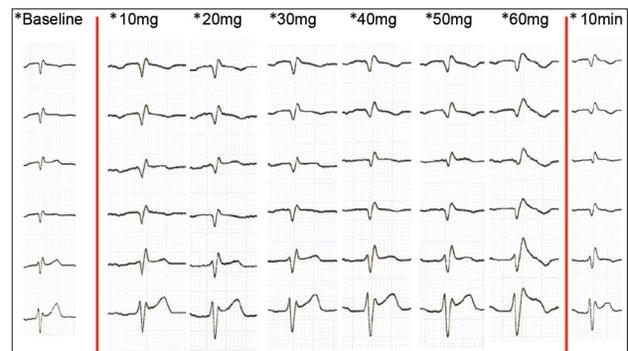


Fig. 3. Ajmaline test. A dose of 10 mg of ajmaline intravenously was administered every minute to achieve Type 1 Brugada pattern or a total dose of 1 mg/kg of body weight.

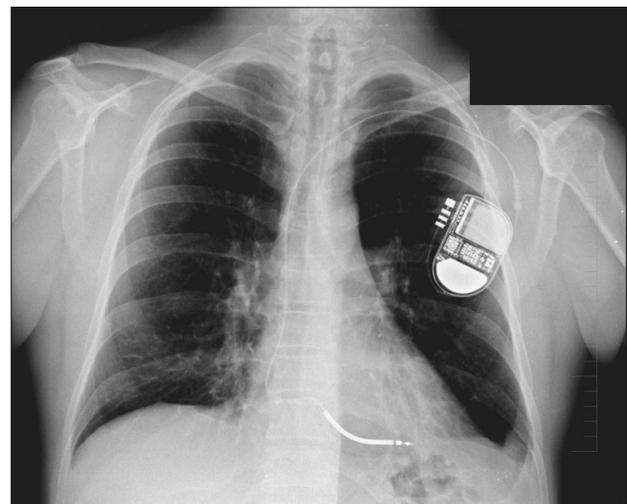


Fig. 4. Single chamber implantable cardioverter-defibrillator was implanted in secondary prevention of sudden cardiac death.

which revealed the Type 1 Brugada ECG pattern (Fig. 3). ECG criteria are discussed below.

The patient was identified as having a concealed Brugada syndrome and according to current guidelines, he had received an implantable cardiac defibrillator (5) (Fig. 4). Until now, the patient feels well, follows the lifestyle behaviour recommendations and is free of ventricular arrhythmias and shocks.

Discussion

The prevalence of BrS is believed to range from 0.2 to 0.5 per 1,000; 8-fold more affected are males (6). According to this, in Slovakia, about 1,000 patients could be affected. BrS is very rare, but the consequence of not recognizing the true signs on ECG can be harmful. Therefore, a clearly defined ECG criteria, both for manifest and concealed types, have to be presented and known.

According to the expert consensus from 2012, there are two ECG patterns in BrS (7) (Fig. 5). Type 1 (manifest “coved” type) is the only diagnostic pattern for BrS. It is characterized by an ST-segment elevation ≥ 2 mm in ≥ 1 right precordial leads V1 to V3,

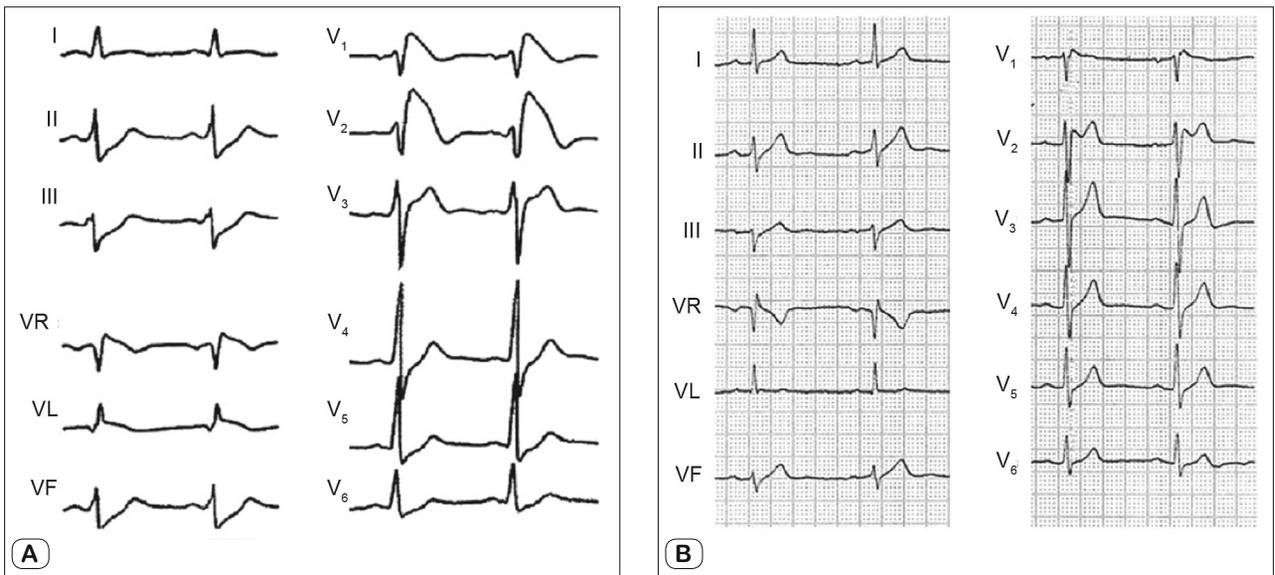


Fig. 5. Two ECG types of Brugada syndrome. A: Type 1 – coved type, manifest. B: Type 2 – saddle-back, concealed.

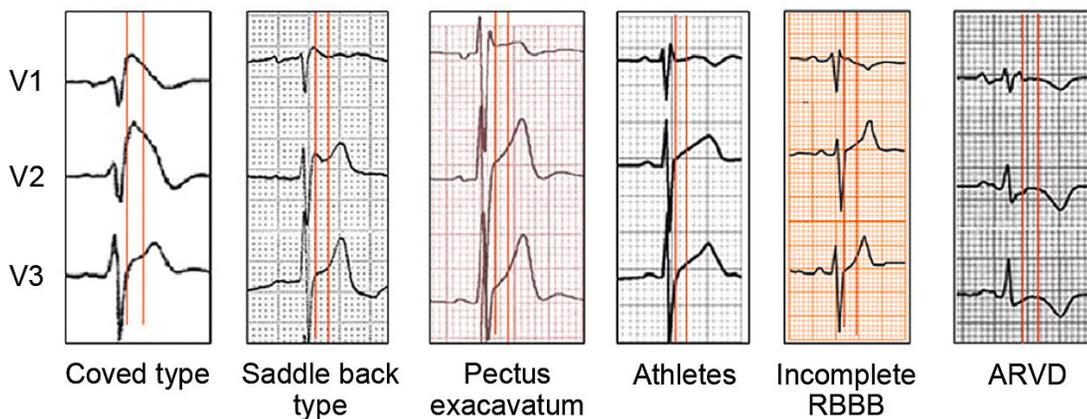


Fig. 6. Differential diagnosis of right bundle branch block-like patterns.

followed by an r' wave and a concave or straight ST segment. The descending ST segment crosses the isoelectric line and is followed by a negative T wave. Type 2 (concealed "saddle-back" type) is only suggestive of BrS. It is characterized by an ST-segment elevation ≥ 0.5 mm in ≥ 1 right precordial leads V1 to V3 followed by a convex ST segment. The r' wave may or may not overlap the J point, but it has a slow downward slope. The ST segment is followed by a positive T wave in V2 and variable morphology in V1.

To facilitate the differentiation of Type 2 ECGs highly indicative of BrS from other Brugada-like patterns (such as right bundle branch block, left ventricular hypertrophy, athletes, pectus excavatum with RVOT compression and arrhythmogenic cardiomyopathy), several additional criteria have been suggested. These criteria utilize the triangle formed by the ascending and descending branches of the r' wave. The β angle of the triangle $\geq 57^\circ$ and the length of the triangle base ≥ 4 mm gives a 95 % positive predictive value of BrS. Also, the length of triangle base duration at the isoelectric line > 1.5 mm may be distinguishing ECG patterns in BrS (8).

To reveal the concealed BrS, a provocative drug test, namely ajmaline test, should be performed. The drug is administered intravenously as a 10-mg bolus every minute to achieve the total dose of 1 mg per 1 kg of body weight. The criteria to stop the test are extension of the QRS complex by more than 25 %, increased occurrence of ventricular ectopy or tachycardia, or revealing the Type 1 Brugada ECG pattern. To make the test more sensitive, the precordial leads should be placed in 2nd, 3rd and 4th intercostal spaces as shown in Figure 6.

In this case, the fever could play a crucial role in provoking the malignant arrhythmia. In the largest study ($n = 428$) reporting on acute cardiac arrest in BrS, fever was present in 6 %, however in 14 % of subjects, there was no information regarding the occurrence of fever during the cardiac arrest (4). The fever in this patient was most likely caused by the ink injection as part of a tattoo procedure. A German study enrolled 3,411 people after skin tattoo procedure. More than 7 % of them reported a "tattoo flu syndrome", manifesting with fever, fatigue and headache. (9).

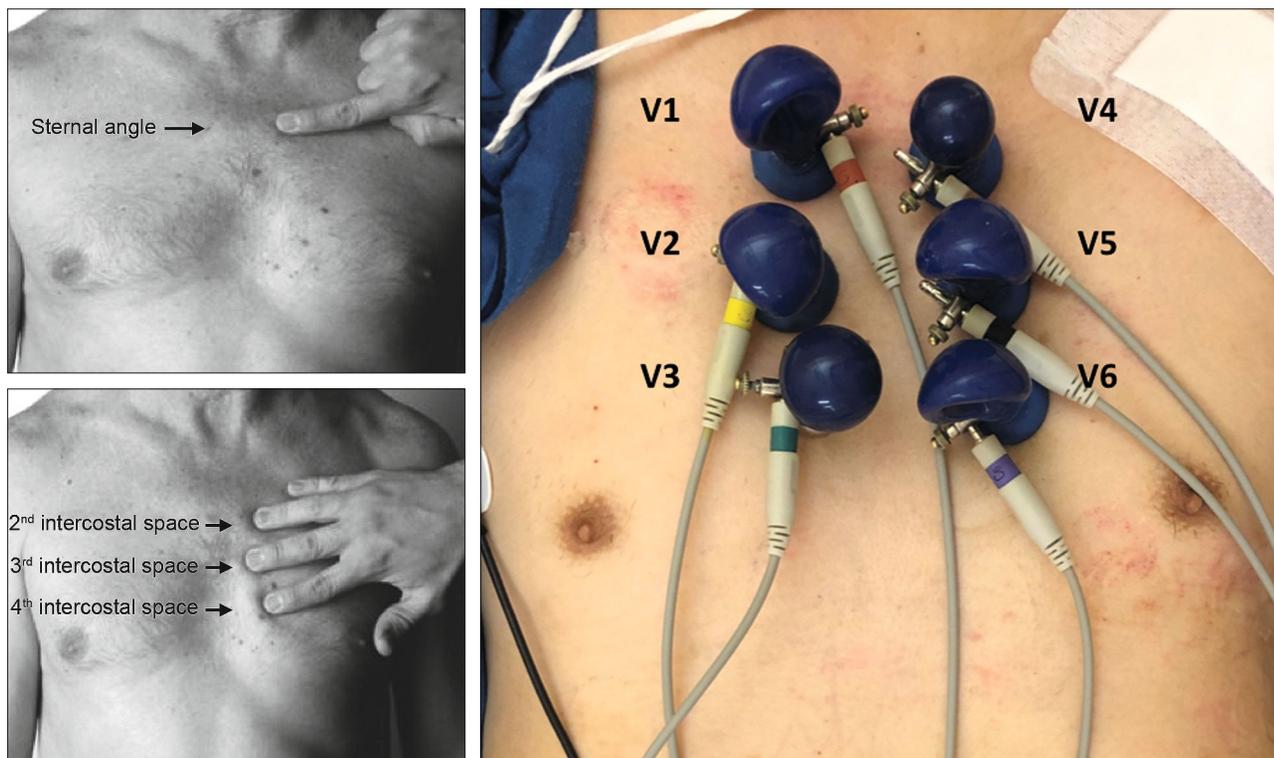


Fig. 7. Placement of precordial leads in 2nd, 3rd and 4th intercostal space makes the test more sensitive.

Hence, we draw attention to a mechanism that can be triggered by a tattoo procedure and progress through the “tattoo flu syndrome” and fever to malignant arrhythmia. This mechanism has not been described yet.

Summary

This clinical case brings two clinical messages. The first is to understand how to capture and confirm concealed Brugada syndrome in patients with suspicious ECG pattern after aborted sudden cardiac death. The second point is that a skin tattoo procedure can induce a fever reaction that could trigger the malignant ventricular arrhythmia in concealed Brugada syndrome patients. This mechanism has not been described yet. Nevertheless, we do not think that routine ECG should be performed before the tattoo procedure because the prevalence of BrS is low.

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