



COVID-19 fever induced dynamic Brugada electrocardiogram

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Abstract

We present an interesting case and images of a patient with identified as having Brugada syndrome due to dynamic electrocardiographic (ECG) changes seen during high-grade fever in the context of an associated COVID-19 infection. We show serial ECGs demonstrating dynamic but unusual change from a Brugada Type-1 to a non-Type-1 Brugada pattern, then ultimately having ECG normalisation once the fever had been corrected with antipyretic medication. This case and set of images illustrate how ECG was helpful in successfully identifying a COVID-19 patient with underlying Brugada syndrome, thus enabling simple but appropriate management and risk-stratification.

Keywords

COVID-19, Brugada Syndrome, Fever induced

Case Report

A previously well middle-aged Caucasian male presented to the emergency department with breathlessness that had worsened over three days and a dry cough. His wife was recovering from confirmed coronavirus disease 2019 (COVID-19). There was no family history of syncope or sudden death.

On examination he had a high-grade fever (38.6 °C), tachycardia, and tachypnoea with abdominal breathing. Lung auscultation revealed right basal crackles. An electrocardiogram (ECG) conducted during the fever showed a coved, downward complex morphology, ST-elevation > 0.2mV, incomplete Right Bundle Branch Block (RBBB), and negative T-waves in leads V1-V3, consistent with Type-1 Brugada pattern (Figures A, B) [1]. Two hours later, with a lower grade fever, a repeat ECG showed persistent broad r'-wave with 0.2mV height and saddleback morphology with 0.1mV ST-elevation in V1-V2, compatible with non-Type-1 Brugada pattern (Figure C). Chest radiography revealed bilateral lower zone pulmonary infiltrates, worsening on subsequent radiography, consistent with COVID-19 pneumonia (Figures E, F), confirmed by positive SARS-CoV-2 nasal and throat swabs. Simple antipyretic medication was administered, leading to ST-segments normalisation when afebrile.

As fever is a key feature of COVID-19 infection, latent cases of Brugada syndrome may be unmasked, providing an opportunity to make the diagnosis, particularly in those patients presenting to the hospital. Importantly, prompt management with simple antipyretic medication such as paracetamol can bring down their fever and

avoid a potentially malignant phenotype, thus reducing ventricular arrhythmia risk [2]. Moreover, due to the almost indivisibility of fever and symptomatic COVID-19 infection, it is critical to be wary of patients who have history of sudden cardiac death in the family and/or previous syncopal episodes, since screening of these patients may unearth an underlying Brugada syndrome.

Brugada syndrome is hereditary with autosomal dominant transmission associated with syncope, ventricular arrhythmia, and sudden death, which occur more frequently during sleep, periods of high vagal tone, and fever. Prognosis in those who are incidentally found to have the ECG finding is not clear. These patients present with a pathognomonic ECG, and their likelihood to develop malignant polymorphic ventricular arrhythmias are heightened, which may lead to syncope or cardiac arrest [2].

We present an unusual set of images for one patient that demonstrated more than one pattern of Brugada ECG [3]. As shown in the dynamic morphologies, the marked change seen in the patient's ECGs taken less than 24 hours apart is the exact reason as to why making the diagnosis of Brugada syndrome can be quite challenging.

Appropriate management and risk-stratification of patients identified with Brugada syndrome is essential. Outpatient follow-up was arranged to allow repeat ECG assessment and for any symptoms, e.g., syncope. He was also advised to avoid drugs such as tricyclic antidepressants, some anti-arrhythmic medications, and cocaine, which can induce Brugada syndrome [4].

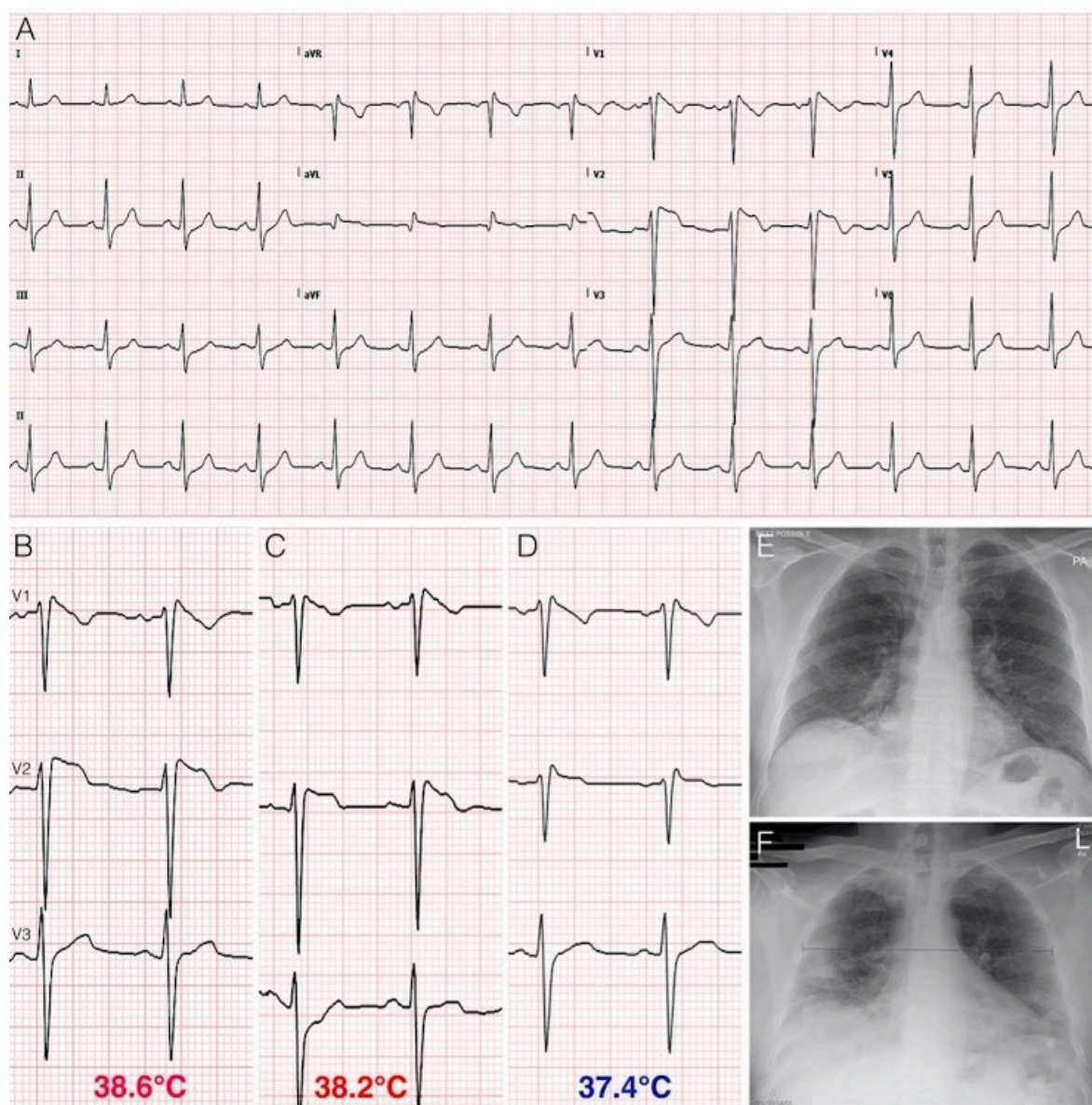
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Legend - (Figures A, B) An electrocardiogram (ECG) conducted during fever showed a coved, downward complex morphology, ST-elevation $>0.2\text{mV}$, incomplete Right Bundle Branch Block (RBBB), and negative T-waves in leads V1-V3, consistent with Type-1 Brugada pattern.

(Figure C) Two hours later, with lower grade fever, a repeat ECG showed persistent broad r'-wave with 0.2mV height and saddleback morphology with 0.1mV ST-elevation in V1-V2, compatible with non-Type-1 Brugada pattern.

(Figure D) ECG changes when apyrexial.

(Figures E, F) Chest radiography revealed bilateral lower zone pulmonary infiltrates, worsening on subsequent radiography, consistent with COVID-19 pneumonia.

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