

September 2023

“What Pattern Does This ECG Show?”

Ravi Choxi

Reading Hospital - Tower Health

Arun Kundra

Reading Hospital - Tower Health

Follow this and additional works at: <https://scholarcommons.towerhealth.org/t-med>



Part of the [Medicine and Health Sciences Commons](#)

Recommended Citation

Choxi R, Kundra A. “What Pattern Does This ECG Show?”. *Transformative Medicine (T-Med)*. 2023; 2(3):72-74. doi: <https://doi.org/10.54299/tmed/ygsw8908>.

This article is brought to you for free and open access by Tower Health. It has been accepted by an authorized editor for inclusion in Transformative Medicine (T-Med).

What Pattern Does This ECG Show?

Ravi Choxi¹, Arun Kundra¹

¹ Department of Cardiology, Tower Health, Reading Hospital, West Reading, PA

[Electrocardiogram Interpretation](#)
[Discussion](#)
[Management](#)
[Key Points](#)
[References](#)

Published September 2023

CASE REPORT

A 62-year-old male with no significant past medical history presents to the emergency room with fevers, generalized weakness and near syncope. He reports that for the past 2 days he has been experiencing symptoms of lightheadedness and weakness reported as long lingering episodes. He denies any syncope, history of cardiac arrest, family history of syncope or sudden cardiac arrest. ECG is obtained during arrival to the emergency room (*figure 1*). Of note, the patient was febrile during the time of the ECG with temperature of 39 degrees Celsius. Repeat ECG was obtained while the patient was normothermic (*figure 2*).

Questions:

Describe the ECG?

What is the next best step?

ELECTROCARDIOGRAM INTERPRETATION

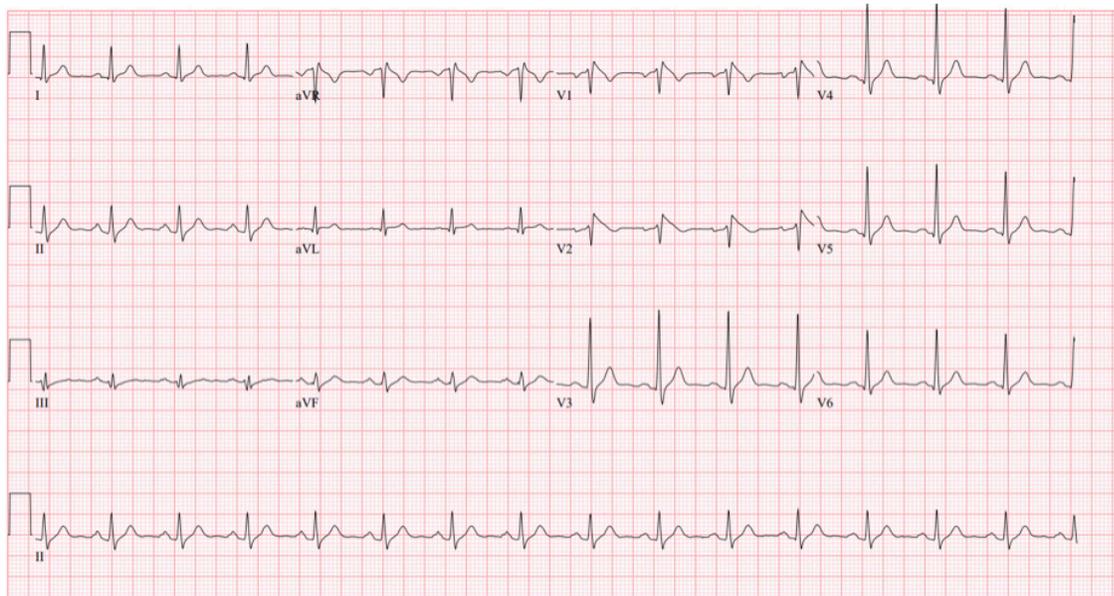
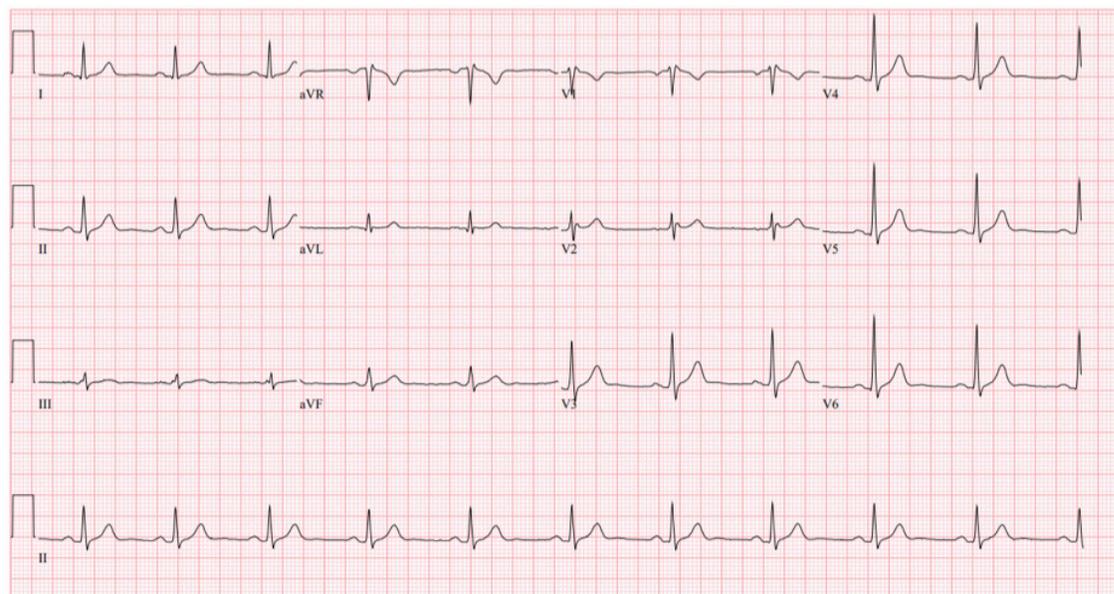
In the initial ECG, there is sinus rhythm with a heart rate of 96 beats per minute. There is significant abnormality of the precordial leads (*V1, V2*). There is approximately 2mm covered ST elevation in *V1* and *V2* with T wave inversion (*Blue Circle below*). This is consistent with type 1 Brugada pattern. In the repeat ECG, there is sinus rhythm with a heart rate of 66 beats per minute. There is no significant ST elevation in *V1* rather there is a saddle back appearing approximately 1 mm ST elevation in *V2* with upright T wave (*Red Circle below*). This is consistent with type 3 Brugada pattern. Figure 3.

Correspondence to Ravi Choxi at ravi.choxi@towerhealth.org

Disclosure Statement: The authors have no conflicts of interest to declare.

DISCUSSION

Figure 1 demonstrates an example of type 1 Brugada ECG pattern. This is defined as coved type ST segment elevation >2 mm followed by negative T wave > 1mm in *V1* or *V2*. Figure 2 demonstrates an example of type 3 Brugada ECG pattern. This is defined as <2mm ST segment elevation with either saddleback or coved morphology of ST segment. Brugada syndrome is a heritable arrhythmia syndrome based on multiple mutations but largely known for loss-of-function mutation of *SCN5A* gene encoding for cardiac sodium channel.¹ This can lead to potential fatal cardiac arrhythmias and sudden cardiac death. The prevalence of Brugada pattern on ECG is estimated at 0.05% with overall low prevalence of Brugada syndrome.² A 12 lead ECG is the hallmark diagnostic test to evaluate for Brugada pattern and then determine whether a patient has Brugada syndrome. These patients typically have a structurally normal heart. Brugada syndrome is defined as having the ECG criteria paired with a clinical criterion consisting of either documented ventricular fibrillation or polymorphic ventricular tachycardia, family history of relative with Brugada syndrome, history of arrhythmogenic syncope or positive genetic test.³ Often, ECG changes can be transient and can be unmasked with fever, ischemia, drugs, electrolyte abnormalities or with Class 1 antiarrhythmic agents such as procainamide challenge. In our case, the type 1 Brugada pattern was unmasked in the setting of fever and resolved once the patient was afebrile. Also, placing the *V1* and *V2* one intercostal space higher than normal position in the 3rd intercostal space can help reveal type 1 pattern.⁴ Of note, the type 1 pattern is the only diagnostic type of Brugada syndrome.

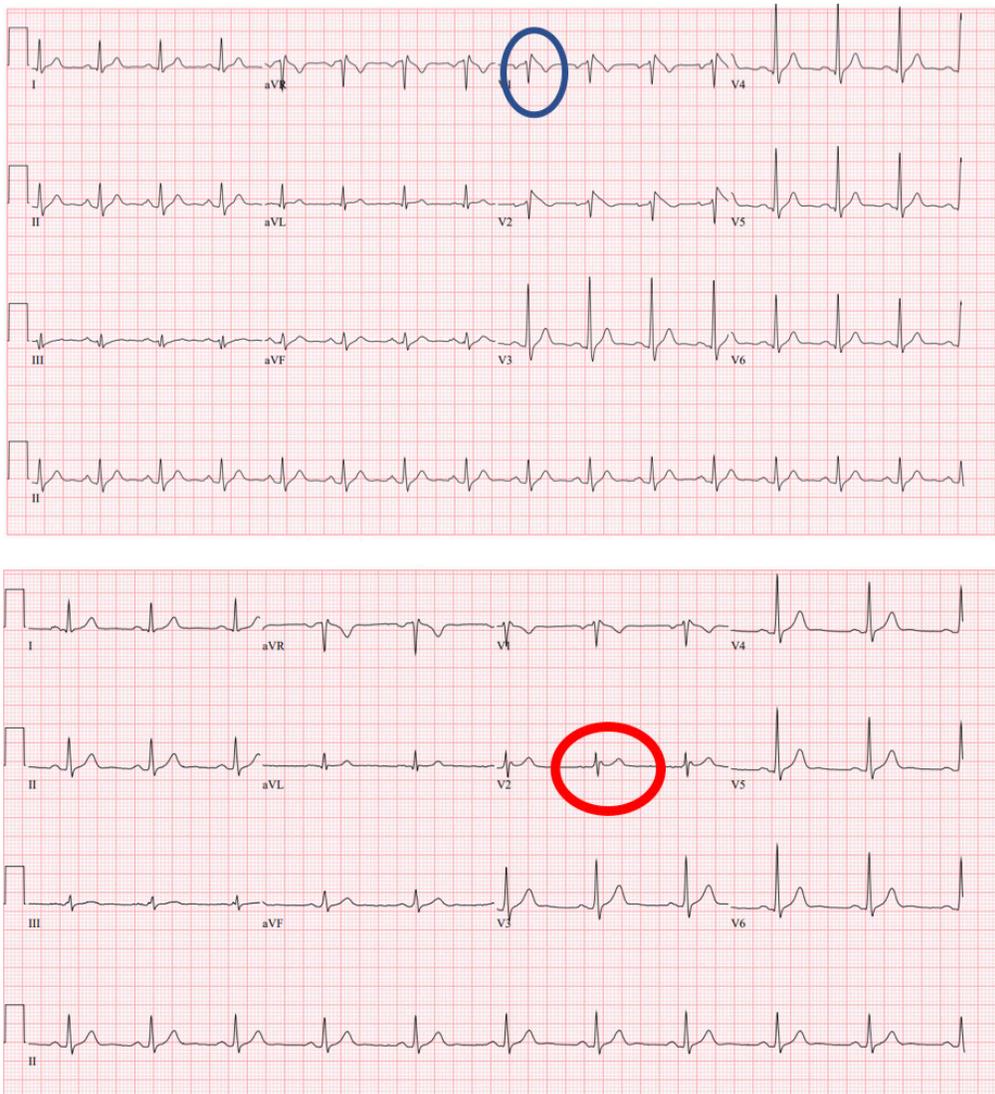
FIGURE 1. 12-lead electrocardiogram when patient was febrile**FIGURE 2.** 12-lead electrocardiogram when patient was afebrile

MANAGEMENT

The main management of patients with Brugada syndrome in the United States is to identify if patients need an Implantable Cardioverter-Defibrillator (ICD). Patient with Brugada syndrome and history of aborted cardiac arrest or arrhythmogenic syncope should receive ICD therapy. Quinidine is the only pharmacologic drug therapy that can be considered but main therapy would be ICD implantation.³ In patients who have a type 1 Brugada pattern that is unmasked in the setting of drugs

or fevers, it is important to minimize the triggers. Aggressive treatment of fever with antipyretic and avoidance of any offending drugs is recommended. Patients with Brugada are often counseled to visit the site brugadadrugs.org to verify if a new drug would be safe to take. In our patient, the type 1 pattern was unmasked in the setting of fever and aggressive treatment was recommended. By history, he did not have any concern for arrhythmogenic syncope, and his pre-syncope episodes were more consistent with vasodilatory state and therefore he did not meet any indication for upfront ICD therapy.

FIGURE 3. ECG 1 and 2 annotated



KEY POINTS

- Identify type 1 Brugada pattern on ECG.
- Brugada syndrome is type 1 Brugada pattern paired with either history of aborted sudden cardiac arrest, syncope, family history of Brugada syndrome or positive genetic test.
- Patients with Brugada syndrome and history of aborted cardiac arrest or syncope should receive ICD therapy.
- Patients with unmasked type 1 Brugada pattern should avoid triggers such as fever, drugs or other precipitants.

REFERENCES

1. Brugada J, Katritsis DG, Arbelo E, et al. 2019 ESC Guidelines for the management of patients with supraventricular tachycardia. The Task Force for the management of patients with supraventricular tachycardia of the European Society of Cardiology (ESC): Developed in collaboration with the Association of European Electrophysiologists. *Eur Heart J.* 2020;41(5):655-720. <https://doi.org/10.1093/eurheartj/ehz467>
2. Postema PG. About Brugada syndrome and its prevalence. *EP Eur.* 2012;14(7):925-928. <https://doi.org/10.1093/europace/eus042>
3. Krahn AD, Behr ER, Hamilton R, Probst V, Laksman Z, Han H-C. Brugada Syndrome. *JACC Clin Electrophysiol.* 2022;8(3):386-405. <https://doi.org/10.1016/j.jacep.2021.12.001>
4. Li KHC, Lee S, Yin C, et al. Brugada syndrome: A comprehensive review of pathophysiological mechanisms and risk stratification strategies. *Int J Cardiol Hear Vasc.* 2020;26:100468. <https://doi.org/10.1016/j.ijcha.2020.100468>