

## ECG TEACHING COMPETITION

## INTERMEDIATE

## IMAGING VIGNETTE: ECG CHALLENGE

# A Pleasant Surprise in the Face of ST-Segment Elevation



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**ABSTRACT**

ST-segment elevation is a dreadful finding in the emergency department because it is often associated with myocardial infarction and demands a prompt and definitive treatment. However, the clinical and echocardiographic assessment of a patient with electrocardiographic changes trumps any electrocardiology expert and should always lead to a clinical decision. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2021;3:1384–1386) © 2021 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

**CASE**

An 85-year-old woman, with a medical history of hypertension and atrial fibrillation (AF), which was treated with apixaban, bisoprolol, and furosemide, came to the emergency department with complaints of atypical chest pain and a syncopal event at home. It was one of the coldest days of the year, and the patient had a tympanic temperature of 34 °C at admission. While awaiting medical observation, the patient had a new syncopal event with quick recovery. She was brought to the resuscitation room where electrocardiography (ECG) was performed (**Figure 1A**). The previous ECG, taken 2 months before, is also shown (**Figure 1B**).

**WHAT IS THE DIAGNOSIS?**

Besides AF, what is your diagnosis?

- A. Acute myocardial infarction (AMI) involving the anterior descending artery
- B. Vasospasm
- C. Acute pulmonary embolism
- D. Hypertrophic cardiomyopathy
- E. Hypothermia

The correct answer is D.

**EXPLANATION**

All the answers are causes of ST-segment elevation and may present with syncopal events. However, a careful examination soon found the correct diagnosis.

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The ECG (**Figure 1A**) shows AF with an average heart rate of 131 beats/min, pathological Q waves in the inferior leads, and significant convex ST-segment elevation in leads V<sub>1</sub> to V<sub>3</sub>. This ECG meets the criteria for left ventricular hypertrophy (LVH) (deepest S-wave in lead V<sub>1</sub> and tallest R-wave in lead V<sub>5</sub>/V<sub>6</sub> ≥35 mm and associated left ventricular [LV] strain pattern) (1).

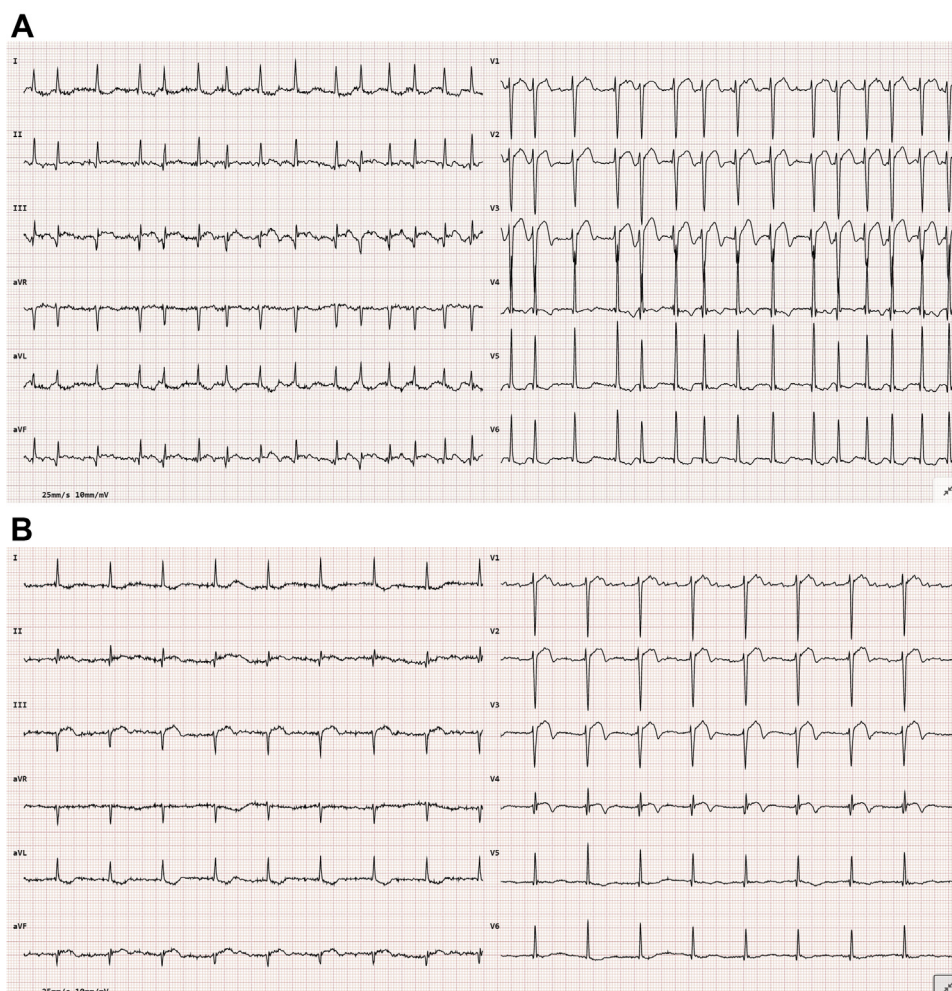
On observation, the patient was remarkably stable. More significantly, a similar ECG pattern was present on a previous examination (**Figure 1B**), thus making it less likely that acute events, such as AMI, pulmonary embolism, or vasospasm, would be the cause of these ECG changes. Sometimes, hypothermia may be associated with Osborn waves (or camel hump waves because of their characteristic shape), which are better seen in the inferior and lateral leads, but they should not be present on separate occasions, as in this case (2).

This correct diagnosis was made with bedside echocardiography that showed normal LV function, but severe LVH, mainly at the interventricular septum and apical LV (**Video 1**). The inferior vena cava was collapsible. The empiric diagnosis of hypertrophic cardiomyopathy (HCM) was made. The combination of HCM with

#### ABBREVIATIONS AND ACRONYMS

**AF** = atrial fibrillation  
**AMI** = acute myocardial infarction  
**ECG** = electrocardiography  
**HCM** = hypertrophic cardiomyopathy  
**LV** = left ventricular  
**LVH** = left ventricular hypertrophy

**FIGURE 1** Electrocardiograms



(A) 12-lead electrocardiogram taken at presentation. (B) 12-lead electrocardiogram taken 2 months before this presentation.

dehydration caused by furosemide intake placed the patient at risk of low stroke volume, which may have caused the syncope. Notably, upon further questioning, the patient stated that several of her kindred had heart conditions, which were later found out to be HCM. Syncope is one of the presenting symptoms of HCM and is related to the dynamic outflow tract obstruction caused by the hypertrophied myocardium, which is made worse due to dehydration. Familial association of HCM cases is common, reflecting the genetic basis of this disease (3).

The patient was treated with intravenous fluids and discharged with a recommendation to stop furosemide.

Although syncope is a classic finding in patients with HCM, other causes of syncope should be excluded, particularly ventricular arrhythmias and tachy-brady syndrome with a possible period of supraventricular tachycardia being succeeded by a pause, particularly in a patient with AF. Because of these diagnostic possibilities, it would be reasonable to recommend an ambulatory prolonged ECG monitoring.

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**KEY WORDS** hypertrophic cardiomyopathy, STEMI mimic, syncope

**APPENDIX** For a supplemental video, please see the online version of this paper.