The de Winter Variation: Anterior ST-Elevation Myocardial Infarction

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PRESENTATION

Complete obstruction of a coronary artery consistently generates ST-segment elevations on the electrocardiogram (ECG). Yet this was not so for a 50-year-old man who presented to the emergency department with a 1-hour history of sudden-onset, severe, substernal crushing chest pain with associated nausea and diaphoresis. He had been smoking 1 pack of cigarettes daily for 25 years but had no significant medical history. His father had a history of premature coronary disease.

Figure 1 The patient’s electrocardiogram demonstrated the de Winter pattern, with ST-segment depressions and tall, symmetrical T-waves across the precordium.

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ASSESSMENT

On examination, the patient appeared anxious and diaphoretic. His blood pressure was 145/90 mm Hg, his heart rate was 78 beats per minute and regular, and his oxygen saturation was 98% on 2 L of oxygen via nasal cannula. Otherwise, his physical examination was unremarkable.
An ECG showed sinus rhythm, ST-segment depressions, and tall, symmetrical T-waves across the precordium (Figure 1). Laboratory studies disclosed an initial troponin I level of <0.05 ng/mL. His troponin I level peaked at 1.25 ng/mL. Results from other laboratory tests, including a complete blood count and a complete metabolic panel, were within the normal range. An urgent bedside transthoracic echocardiogram revealed a left ventricular ejection fraction of 45%-50% with hypokinesis of the apex.

**DIAGNOSIS**

The patient was taken emergently to the cardiac catheterization laboratory, where a coronary angiogram identified complete occlusion of the proximal left anterior descending artery. Typically, when a thrombus obstructs a coronary artery and spurs an acute myocardial infarction, the event is reflected on the ECG as ST-segment elevation. The pattern is so reliable that the clot-induced damage is defined as an ST-segment elevation myocardial infarction. Nonetheless, approximately 2% of patients with acute complete occlusion of the proximal left anterior descending artery do not have the usual ST-segment elevation but instead have the de Winter ECG pattern, which was first described in 2008. The pattern is characterized by tall, symmetrical T-waves that are preceded by a 1- to 3-mm up-sloping ST-segment depression at the J-point in leads V1-V6. Unlike the dynamic electrocardiographic changes, such as the hyperacute T-waves occasionally seen early in an ST-elevation myocardial infarction, this ECG configuration is static and resolves only after reperfusion of the vessel.

Knowledge of the de Winter ECG pattern is essential to recognition of acute myocardial infarctions that would be missed by computer-based algorithms. Patients experiencing ST-segment elevation myocardial infarction—even in the absence of the usual ST elevations on ECG—require emergent reperfusion therapy with percutaneous coronary intervention, fibrinolysis, or emergency coronary revascularization surgery. Rapid recognition and treatment salvages myocardium and improves outcomes and long-term prognosis.

**MANAGEMENT**

Our patient underwent successful percutaneous coronary intervention, with drug-eluting stents placed in the proximal and mid-left anterior descending artery (Figure 2). His symptoms subsequently dissipated. A postprocedure ECG showed resolution of the ST-segment and T-wave abnormalities. The remainder of his hospitalization was uneventful.

**References**