CASE REPORT

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An Overlooked Electrocardiogram Pattern: de Winter Pattern

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ABSTRACT Electrocardiogram (ECG) is an imaging tool used in the diagnosis of acute coronary syndrome. ST elevation is seen in total occlusion of the coronary artery. However, there are a number of high-risk ECG patterns that do not meet the criteria for ST-segment elevation myocardial infarction (STEMI) but are still suggestive of coronary artery occlusion. An ECG pattern called the de Winter pattern is an ECG pattern that indicates severe occlusion of the proximal left anterior descending artery. In the de Winter pattern, there is an upward sloping ST segment at the J point that continues into long, positive symmetric T waves in the precordial leads. This ECG pattern is equivalent to a STEMI; therefore these patients should be triaged for emergency intervention. This case report describes a patient with this finding and reviews the current literature.

Keywords: Myocardial infarction; de Winter pattern; acute coronary syndrome; coronary artery disease

Ischemic heart disease can be treated across a broad clinical spectrum, from silent ischemia to sudden death. Most deaths are related to acute coronary syndromes (ACS) and their complications.[1] Although ACS are a condition in which there are serious advances in treatment, they continue to be very important in terms of patient potential. Rapid diagnosis and intervention are extremely important for adequate treatment.[2,3] Although the differential diagnosis of ACS continues to be important, studies conducted over the years have shown that there are different acute coronary conditions and have revealed new electrocardiographic patterns.[4,5] One of these patterns is the de Winter pattern, first published by de Winter et al. in 2008, which includes specific changes in electrocardiography (ECG) and suggests that left anterior descending (LAD) artery occlusion should be treated in the acute phase. As suggested in the article by de Winter et al., this includes at least 1 mm negativity of the ST segment starting from the J point in the precordial leads, pointed and symmetrical T waves, and small ST elevation (0.5 mm-1 mm) in aVR.[6,7] de Winter pattern occurs as an acute manifestation of coronary artery occlusion, such as ST-segment elevation myocardial infarction (STEMI). Although LAD occlusion is predominantly seen, there are also studies involving other coronary arteries.[8,9] de Winter pattern is a rare condition and has been observed to occur in patients with anterior myocardial infarction at rates ranging between 2% and 3.4% in different case series.[9]

In this case, we presented a case with de Winter pattern in the ECG.

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A 31-years-old male patient presents to the emergency department with a complaint of compressive

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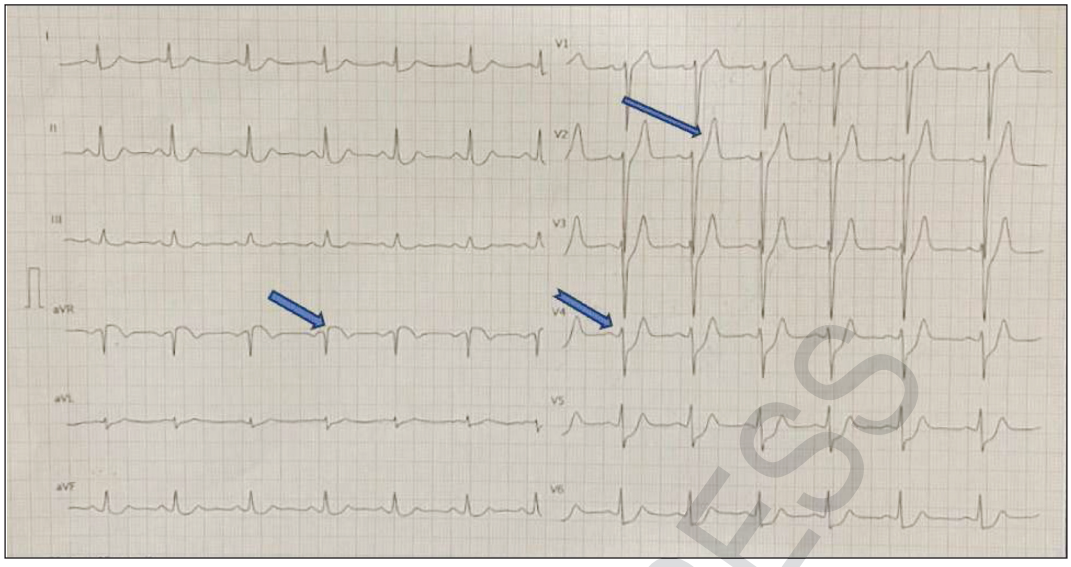

FIGURE 1: Electrocardiogram of the patient at the time of admission to the emergency department.

chest pain that has been present for two days. In the patient's family history, it was learned that his parents were cousins and both had a history of ACS under the age of 40. The patient has a 5 pack/year smoking history. Our patient has no known history of additional diseases. In the 12-lead ECG taken at our patient's admission to the emergency department, there were high-protruding symmetrical T waves in the precordial leads, >1 mm upward-sloping ST segment depression at the J point, absence of ST segment elevation, and ST segment elevation (0.5 mm-1 mm) in aVR (Figure 1). In the echocardiography (ECHO), the anterior region was hypokinetic and the ejection fraction was found to be 35%. When the patient's current clinical condition and ECG and ECHO findings were evaluated, the patient was taken to the coronary angiography (CAG) laboratory with the diagnosis of ACS. In the CAG performed on the patient, a 90% thrombosed lesion in the LAD was followed by a 30% lesion in the right coronary artery (RCA) and a plaque in the circumflex artery (Figure 2, Figure 3, Figure 4). A stent was applied to the patient's responsible lesion in the LAD. The procedure was completed successfully without complications. . In the patient's 12-lead ECG taken after CAG, the ST segment in aVR in the precordial segments returned to the isoelectric line and the ST segment elevation in aVR returned to the isoelectric line (Figure 5).

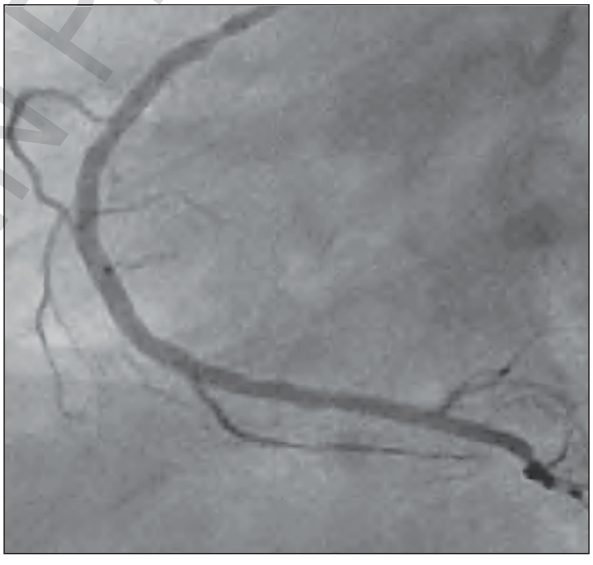

FIGURE 2: Angiographic image of the patient's right coronary artery vessel.

Informed consent form was obtained from the patient.

DISCUSSION

The purpose of this case report is to emphasize that this ECG pattern is as important as STEMI and that these patients should undergo immediate percutaneous coronary intervention because the de Winter pattern occurs as a consequence of significant narrowing of the proximal LAD. The de Winter pattern

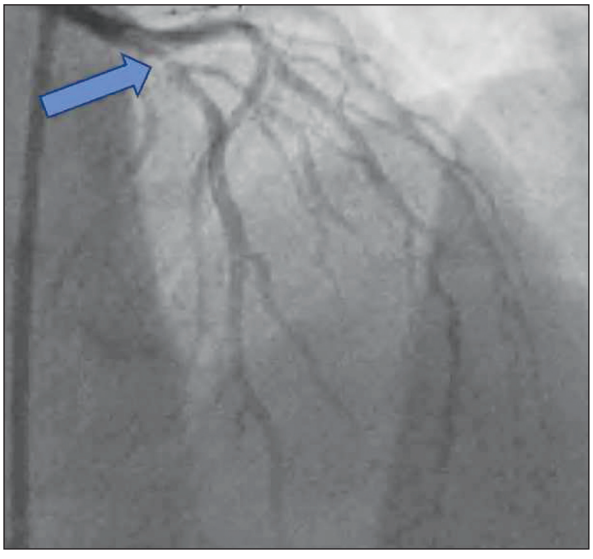

FIGURE 3: Angiographic image of the responsible lesion in the patient's left anterior descending vessel.

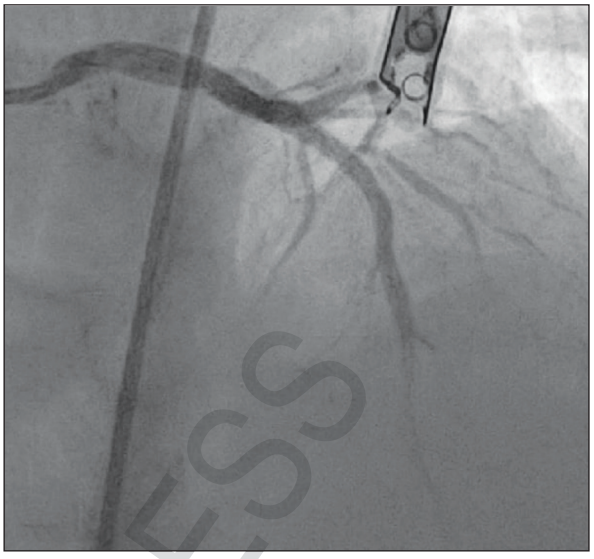

FIGURE 4: Angiography of the left anterior descending vessel after the procedure.

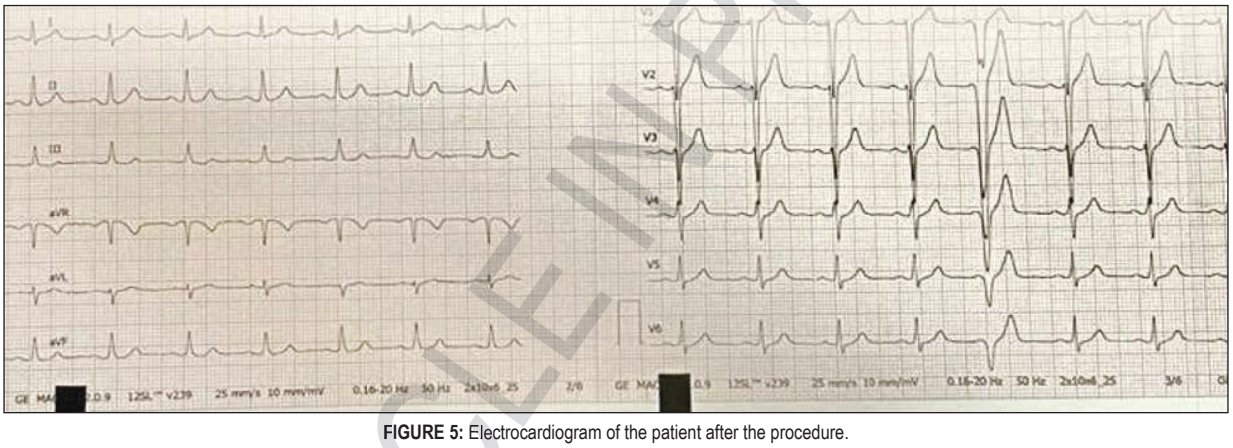

FIGURE 5: Electrocardiogram of the patient after the procedure.

was identified in 2% of patients with myocardial infarction in the LAD and was associated with a mortality of 27% within the first week.[9] Initially, it was described as a pattern obtained on average 1.5 hours after the onset of chest pain. Later, it was suggested that the de Winter pattern was on a continuum with ECG changes of subendocardial ischemia and transmural infarction of STEMI.[10] Ghaffari et al. reported RCA occlusion in a patient with de Winter pattern in inferior leads.[11] Chen et al. reported a case of de Winter ECG pattern in a patient who underwent primary percutaneous coronary intervention to the RCA and perioperatively developed new-onset chest pain and de Winter complexes, staging PTCA to the LAD and Cx.[12] The resulting coronary angiographies did not reveal any significant restenosis in the epicardial coronaries or stent thrombosis, and the development of such de Winter complexes has been attributed to perioperative microvascular ischemia due to increased cardiac biomarkers.

The mechanism of the de Winter model has not yet been determined, but it has been suggested that it may develop due to lack of activation of potassium-sensitive ATPase channels due to ischemic exhaustion.[12] In the hyperacute phase of STEMI, tall, symmetrical T waves are caused by subendocardial ischaemia. In the acute phase of STEMI, ST-segment elevation is caused by transmural ischaemia. However, the sensitivity to ischaemia is different between endocardium and epicardium, es-

pecially the cells at the junction between the intermediate myocardium and the endocardium. Hypoxia in the mid-myocardium may be the main cause of ECG manifestation of the de Winter pattern.[13]

de Winter patterns are high-risk ECG patterns associated with a large area of transmural infarction, necessitating early diagnosis and rapid intervention by the healthcare team. Primary PTCA reperfusion should be the mainstay of therapy. de Winter T waves should be clearly articulated in training courses and guidelines so that patients can receive appropriate treatment in a timely manner, reducing morbidity and mortality.

Source of Finance

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

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