

UNCOMMON ECG ABNORMALITY DUE TO PROXIMAL OCCLUSION OF LAD CORONARY ARTERY: DE WINTER PATTERN

ALTERAÇÃO ELETROCARDIOGRÁFICA INCOMUM POR OCLUSÃO DE CORONÁRIA DESCENDENTE ANTERIOR: PADRÃO “DE WINTER”

ABSTRACT

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The electrocardiogram (ECG) is a crucial tool in the evaluation of patients with acute coronary syndrome (ACS), since it allows the early identification of patients with signs of coronary occlusion (ST-elevation myocardial infarction – STEMI), who benefit from emergency myocardial reperfusion strategies. On the other hand, cases of non-ST-elevation ACS presumably have no coronary occlusion, and the ECG may show signs of ischemia such as symmetrical T-wave inversion, ST-segment depression, or even be normal in up to 15% of cases. However, a rare ECG pattern, known as the “De Winter” pattern, related to an acute occlusion of the Left Anterior Descending (LAD) coronary artery in its proximal third segment, has been recently described without ST-segment elevation. This is a case report of a young male patient with typical chest pain symptoms less than one hour after an elective LAD angioplasty, who presented with “De Winter” pattern on the ECG and had confirmed acute stent thrombosis. The recognition of this unusual electrocardiographic pattern is essential to guarantee emergency coronary reperfusion therapy in cases of acute coronary syndrome.

Keywords: Electrocardiography; Coronary Occlusion; Acute Coronary Syndrome.

RESUMO

O eletrocardiograma (ECG) é fundamental na avaliação dos pacientes com síndrome coronariana aguda (SCA), pois possibilita a identificação precoce dos pacientes com sinais de oclusão coronariana (infarto agudo do miocárdio com supradesnivelamento do segmento ST - IAMCSST), que se beneficiam com estratégias de reperfusão miocárdica de emergência. Os casos de SCA sem supradesnivelamento de segmento ST pressupõem ausência de oclusão coronariana, e o ECG pode mostrar sinais de isquemia como inversão simétrica de ondas T, infradesnivelamento de segmento ST, ou mesmo ser normal em até 15% dos casos. No entanto, recentemente foi descrito um padrão eletrocardiográfico raro, conhecido como padrão “De Winter”, relacionado à oclusão coronariana aguda da artéria descendente anterior (ADA) em seu terço proximal, na ausência de supradesnivelamento de segmento ST. Este é o relato de um paciente jovem, do sexo masculino, com quadro clínico anginoso típico, menos de uma hora depois de angioplastia eletiva da ADA, que apresentou padrão “De Winter” no ECG e teve confirmada trombose aguda de stent. O reconhecimento desse padrão eletrocardiográfico incomum é fundamental para garantir terapia de reperfusão coronariana emergencial em casos de síndrome coronariana aguda.

Descritores: Eletrocardiografia; Oclusão Coronária; Síndrome Coronariana Aguda.

INTRODUCTION

Early identification of electrocardiographic changes associated with acute coronary occlusion, particularly ST-segment elevation in two or more contiguous leads, plays a fundamental role in emergency reperfusion treatment in ACS.^{1,2}

A new electrocardiographic pattern, described by De Winter R. et al. in 2008, was reported in approximately 2% of the cases of acute occlusion of the left anterior descending (LAD) coronary artery.³ The trace showed a ST-segment depression

of 1 to 3 mm at the J-point, followed by a rapid ascending morphology and symmetric apical T-wave in precordial leads.³⁻⁶

This pattern may or may not present R-wave progression, and the QRS is usually narrow. Another common feature in the electrocardiogram (ECG) was ST-segment elevation of 1 to 2 mm in the aVR lead. Although most patients presenting this pattern underwent primary percutaneous coronary intervention, approximately 25% of the cases progressed to left ventricular dysfunction.⁷

CASE REPORT

A 27-year-old male patient was admitted at the Interventional Cardiology Service in December 2016 to treat an 80% obstructive lesion in the proximal third of the LAD.

Before the procedure, the ECG showed a sinus rhythm with a negative T-wave in the inferior wall due to a previous acute myocardial infarction (AMI) that occurred in November 2016. The patient underwent right coronary artery angioplasty with a conventional stent for the same, and an intervention to repair the LAD lesion was scheduled in the following month. The patient had a history of smoking (one pack per day for 10 years), and his father suffered an early AMI at 45 years of age. He denied the use of any illicit drugs.

The LAD angioplasty with a bioabsorbable stent was performed with no complications. However, 40 minutes after the procedure, the patient complained of precordial pain accompanied by sweating, and the ECG showed the De Winter pattern (Figure 1). Emergency coronary angiography revealed acute stent thrombosis (Figure 2), probably due to malposition of the stent. After balloon occlusion, abciximab and full-dose heparin anticoagulant were administered. The coronary 'thrombolysis in myocardial infarction' grade-3 flow was recovered, the patient showed improvement, and was discharged after two days. Analysis of thrombophilia was not performed because of the recent anticoagulation procedures during the initial LAD angioplasty. Laboratory tests showed preserved renal function (creatinine 0.9 mg/dL), normal hemogram and electrolytes, normal free thyroid stimulating hormone and thyroxine values, and normal lipidogram (total cholesterol 160 mg/dL, high-density lipoprotein 48 mg/dL, low-density lipoprotein 86 mg/dL, triglycerides 130 mg/dL). The ECG showed preserved ventricular function with hypokinesia area in the anteroapical segment.

DISCUSSION

In the management of patients with acute coronary syndrome, ST-segment elevation is the main electrocardiographic marker of acute coronary occlusion. However, it is important

to consider the De Winter pattern as equivalent to ST-Elevation Myocardial Infarction. Some authors suggest that the guidelines should be updated to include this topic.⁸

Elevated and symmetrical T-waves constitute a transient and early sign of MI, predominantly in the epicardial region, and generally progress rapidly to ST-segment elevation. However, this progression is not observed in most cases presenting the De Winter pattern, which is considered to be persistent over time.^{4,9} It should be noted that serum potassium levels in the cases described in the literature, including the current one, were within the normal range,^{3,4} although the differential diagnosis of symmetric and apical T-waves is known to include hyperkalemia.

The electrophysiological explanation for the phenomenon remains speculative. Theories suggest the presence of an anatomical variant of the Purkinje fibers with delay in endocardial conduction properties. It is also possible that the absence of ST-segment elevations results from the non-activation



Figure 2. Coronary arteriography showing intrastent thrombosis in the proximal left anterior descending coronary artery.

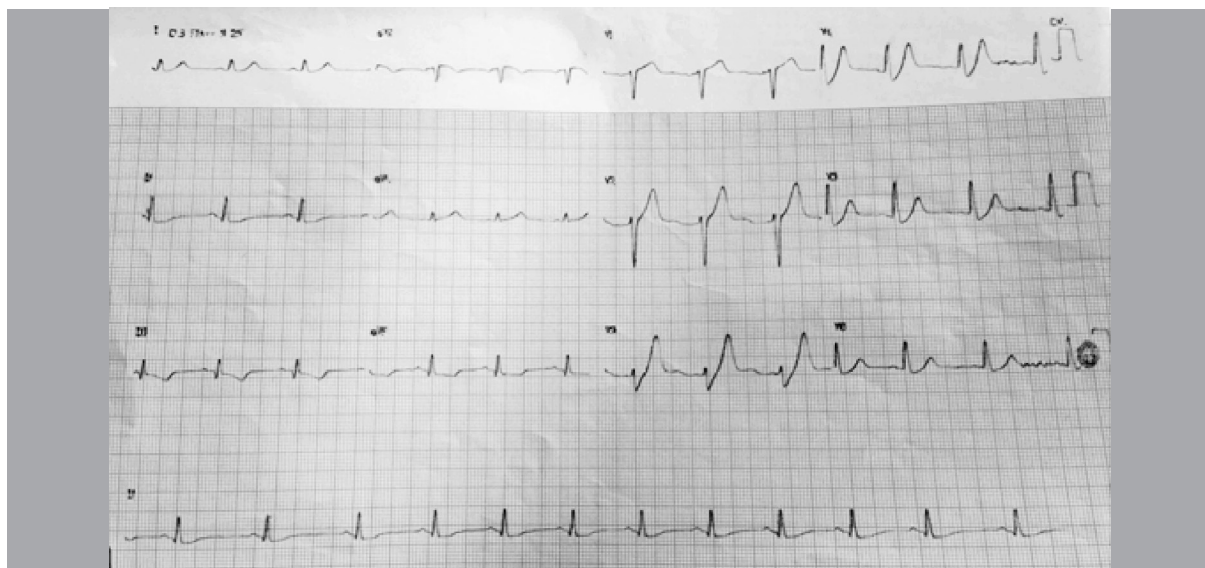


Figure 1. Electrocardiogram showing ST-segment depression of a fast ascending pattern, and an apical and symmetrical T-wave in precordial leads (particularly, V3 to V6); T-wave inversion in inferior leads (DII, DIII, aVF) already existed previously due to infarction with no ST-segment elevation with right coronary angioplasty, one month prior to the current procedure.

of the adenosine triphosphate (ATP)-sensitive sarcolemma potassium channels due to ATP depletion caused by MI.^{3,4,9}

With respect to the demographic profile, it was demonstrated that patients exhibiting the De Winter pattern were mostly young males with a higher incidence of hypercholesterolemia, as compared to those with classic electrocardiographic changes of AMI with ST-segment elevation.^{4,6,9} Our patient was a young male, but without hypercholesterolemia.

CONCLUSION

Identification of the De Winter pattern is crucial to ensure early coronary reperfusion measures and should be

considered equivalent to ST-segment elevation in cases of acute coronary syndrome. It is very important to create awareness about this pattern because it is a rare presentation, where an ECG with no ST-segment elevation indicates LAD occlusion, and needs immediate reperfusion.

CONFLICTS OF INTEREST

The author declares that he has no conflicts of interest in this work.

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