



## The «de Winter» pattern as equivalent of acute ST segment elevation myocardial infarction

### Patrón de «de Winter» como equivalente de infarto agudo de miocardio con elevación del ST

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#### Keywords:

The «de Winter» pattern, electrocardiogram, acute myocardial infarction, percutaneous coronary intervention, proximal left anterior descending artery, occlusion.

#### Palabras clave:

Patrón de «de Winter», electrocardiograma, infarto agudo de miocardio, intervención coronaria percutánea, segmento proximal de la arteria descendente anterior, oclusión.

#### ABSTRACT

We present a case of a young patient with anginal chest pain, electrocardiogram (ECG) showed «de Winter» pattern characteristics, which was first reported in 2008 by Winter et al, being so far, an atypical electrocardiographic presentation of ST elevation acute myocardial infarction (STEMI) little reported in the literature. The «de Winter» ECG pattern is characterized by high and symmetrical T waves along with J-point depression in all precordial leads, associated with proximal left anterior descending artery (LAD) occlusion. In this patient, the best treatment was emergency coronary angiography with primary percutaneous coronary intervention (PCI) placing a LAD drug-eluting stent, with successful result, improving patient's prognosis. Current guidelines do not take into account the «de Winter» ECG pattern as an equivalent of STEMI, however, literature reports an association with acute myocardial ischemia that endangers the patient's life; we consider necessary to include this ECG pattern in the STEMI guidelines, in order to allow doctors in charge of emergency services become familiar with this diagnosis and to be able to offer a timely and effective treatment to patients.

#### RESUMEN

Presentamos el caso de un paciente joven con dolor torácico anginoso, con electrocardiograma (ECG) que muestra características del patrón de «de Winter», reportado por primera vez en el 2008 por Winter y colaboradores. Hasta el momento es una presentación electrocardiográfica atípica de infarto agudo de miocardio con elevación del segmento ST (IAMCESST) poco reportada en la literatura. Las características de este patrón encontradas en el ECG son ondas T altas y simétricas, asociadas con depresión del punto J en todas las derivaciones precordiales; este tipo de patrón se asocia a oclusión del segmento proximal de la arteria descendente anterior (DA). El tratamiento correcto en este caso fue la realización de angioplastia coronaria percutánea con colocación de stent liberador de fármaco a la DA, con resultado exitoso, lo que mejoró la supervivencia del paciente. Las guías actuales no toman en cuenta este patrón electrocardiográfico como equivalente de IAMCESST; no obstante, los reportes de la literatura lo asocian a isquemia miocárdica aguda, que pone en peligro la vida del paciente; consideramos necesario incluir este patrón electrocardiográfico en las guías de IAMCESST y, de esta manera, permitir a los médicos a cargo de los servicios de urgencias familiarizarse con este diagnóstico y ser capaces de ofrecer un tratamiento oportuno y efectivo para los pacientes.

#### INTRODUCTION

Despite the multiple programs implemented for detection and timely treatment of acute coronary syndromes, acute myocardial infarction (AMI) is the principal cause of death worldwide. Immediate coronary reperfusion therapy, through intravenous fibrinolysis or percutaneous coronary intervention, has allowed to reduce mortality and complications.<sup>1</sup> In addition to the characteristic electrocar-

diographic pattern in the STEMI, there are at least five patterns mentioned in the literature as equivalents of STEMI, potentially fatal without immediate diagnosis and treatment; within these patterns are described isolated posterior infarction, Wellens syndrome A and B, hyper-acute T waves, complete left bundle branch block, the sign of «shark fin» and the «de Winter» pattern.<sup>2,3</sup> In 2008, Winter et al described in 30 of 1532 (2.0%) young men patients with hypercholesterolemia and with

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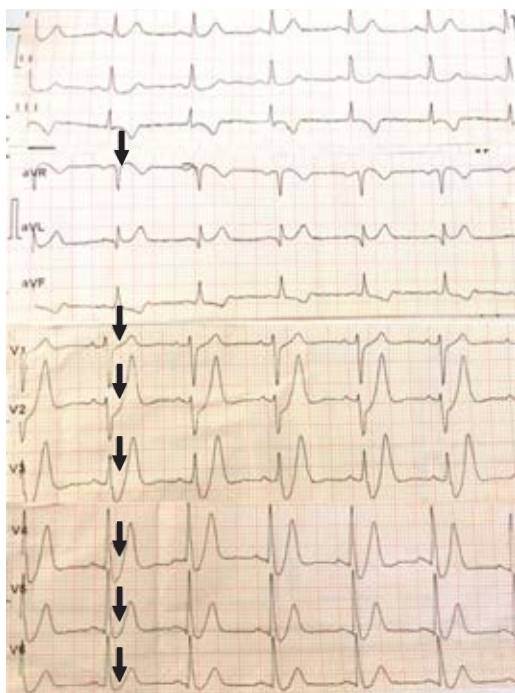
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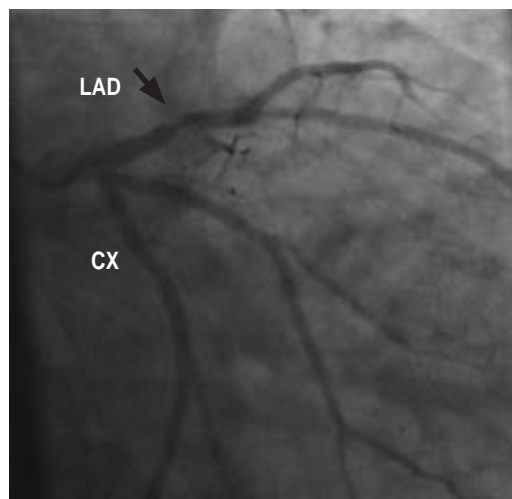
occlusion of the anterior descending artery, an electrocardiographic pattern that they called the «de Winter», characterized for 1) ascending depression of the ST segment  $> 1$  mm at point J of the precordial leads (V1-V6), 2) high, prominent and symmetrical peak T waves, without classical variation of the ST segment in the precordial leads and, 3) slight ST segment elevation (0.5-1 mm) in the aVR lead.<sup>4,5</sup> The objective of this case is the early recognition of the «de Winter» pattern as equivalent of STEMI, allowing the timely treatment of acute coronary syndrome with atypical electrocardiographic characteristics.

### CASE PRESENTATION

A 43-year-old obese male, with history of smoking, is presented to the emergency department because of suddenly thoracic oppressive pain, intensity 9/10 for more than 20 minutes, accompanied by nausea, palpitations and anxiety; the patient self-medicated with NSAIDs, with partial improvement. The physical examination revealed blood pressure of 130/80 mmHg, heart rate of 78 bpm, respira-

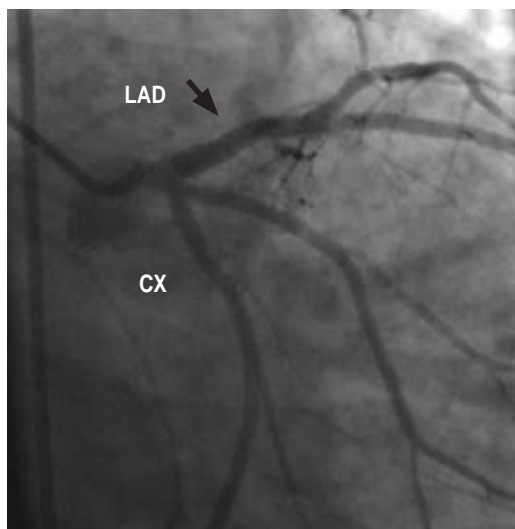


**Figure 1:** Initial ECG with the «de Winter» pattern.



**Figure 2:** Diagnosis coronary angiography with subtotal occlusion of the proximal left anterior descending artery (LAD) (black arrow).

tory rate of 17 rpm, temperature 36.7 °C and pulse oximetry saturation in 91%; a normal S1 and S2 cardiovascular examination, with no apparent murmurs. Laboratory tests reported TnI 0.025  $\mu$ /L (0.010-0.023). In the 12-lead electrocardiogram obtained at admission, sinus rhythm, significant depression of the ST segment ( $> 1$  mm) at point J in leads V3-V6, and high and symmetrical T waves in leads V2-V6 were observed, with slight elevation of the ST segment in the aVR lead (0.05 mm) and moderate reciprocal depression of the ST segment in lower leads (Figure 1). The «de Winter» electrocardiographic pattern was recognized and treated as equivalent to STEMI, coronary angiography was indicated. clopidogrel 600 mg, acetylsalicylic acid 300 mg and atorvastatin 80 mg were administered orally, as well as 5000 IU intravenous unfractionated heparin. Urgent coronary angiography was performed using right femoral access, which showed single-vessel disease with acute LAD occlusion (Figure 2). PCI was performed with successful placement of a drug-eluting stent (everolimus) of 3.5 x 18 mm in LAD, restoring arterial blood flow (Figure 3). In the follow-up studies, the post-procedure ECG showed an anteroseptal STEMI with Q waves in leads V1-V3, with extensive anterior subepicardial ischemia, lower leads and aVR returned to



**Figure 3:** PCI with successful placement of a drug-eluting stent in LAD (black arrow).

normal (Figure 4); patient remained stable in the coronary unit. Echocardiogram 24 hours after the procedure reported antero apical hypokinesia with 52% ejection fraction (Figure 5). The patient evolved without complications and 72 hours later he was discharged at home with dual antiplatelet therapy, statin, beta blocker and angiotensin converting enzyme inhibitor.

### DISCUSSION

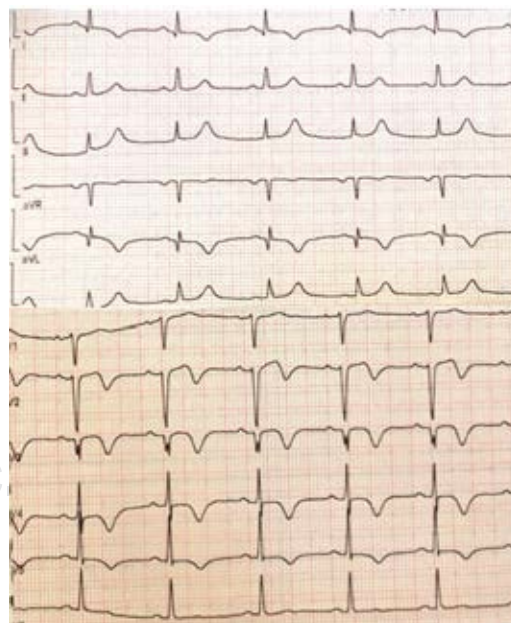
The introduction of the electrocardiogram as a diagnostic tool in the medical area, has allowed the rapid identification of AMI and with it, timely treatment and better prognosis, however, up to 2% of patients with STEMI can present an atypical ECG pattern, which in inexperienced hands could go unnoticed, delaying the proper treatment established by guides.<sup>6</sup> The «de Winter» pattern is the atypical electrocardiographic expression of a LAD occlusion, which for reasons that to date are not clear, is not expressed with ST elevation as would be expected, so the condition can be confused with an AMI without ST elevation and thereby, delay the urgent treatment required, either intravenous thrombolysis (in the case of hospital centers that do not have a hemodynamic room) or PCI.<sup>7,8</sup>

The delay in the optimal management of patients with STEMI with typical or atypical presentation on the ECG, brings with it an increased risk of complications around the so-called major adverse cardiovascular events (MACE), however, until now there is no section in the current clinical guidelines of acute coronary syndromes that describe and indicate the management of these patients with the urgency that is required.<sup>9</sup>

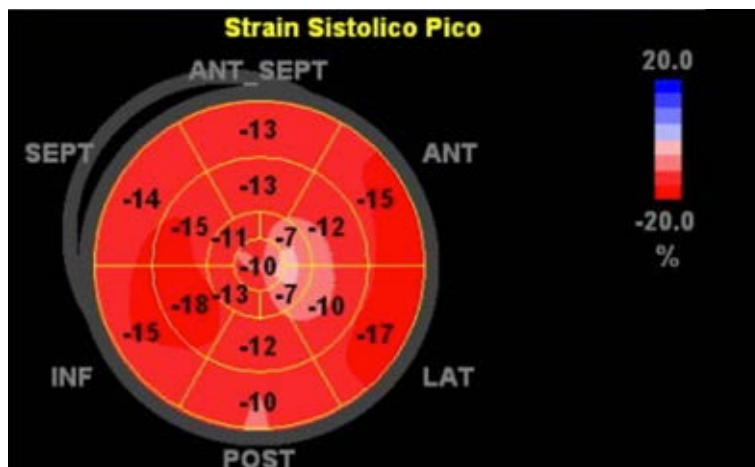
The knowledge of the «de Winter» pattern will allow the first contact physician in the emergency department to familiarize themselves with this finding, identifying the cases and avoiding overlooking ECG particularities, that may have an impact on the treatment and prognosis of patients with STEMI.<sup>10</sup>

### CONCLUSIONS

In addition to the typical electrocardiographic pattern of ST segment elevation in acute myocardial infarction, there are other electrocardiographic patterns reported in the literature as equivalents of STEMI, such as the «de Winter» pattern, the recognition of these patterns is very important to provide early revascularization therapy.



**Figure 4:** Post-procedure ECG with normalization ST segment and extensive anterior subepicardial ischemia.



**Figure 5:** 24 hours post-procedure echocardiogram reported antero apical hypokinesia.

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