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Timely recognition of acute coronary occlusion in patients presenting without ST-segment elevation: a major clinical challenge. Authors’ reply

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Atypical patterns of de Winter sign: Even more confusion in clinical practice

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TO THE EDITOR
Over recent years, de Winter sign has drawn a particular interest as an important equivalent of anterior ST segment elevation myocardial infarction (STEMI) [1–3]. This electrocardiographic (ECG) phenomenon generally presents with certain changes in the precordial leads (primarily characterized by J point depression along with prominent "T waves" mostly located in V2 and V3) accompanied by a slight ST segment elevation in aVR [2, 3]. Basically, de Winter sign has been ascribed to potential factors including severe transmural ischemia and conduction defects [2]. Importantly, it strongly mimics ECG findings of relatively non-emergent acute coronary syndromes (ACSs) with ST segment depression potentially necessitating a high index of suspicion for its diagnosis [2, 3]. In their recently published article, Theodoropoulos KC, et al. have reported an interesting de Winter sign in a young male [1]. Accordingly, we would like to make a few comments on their case and further implications of de Winter sign in clinical practice:

First, the authors have considered their case as a combined presentation of hyperacute T waves and de Winter sign [1]. However, we hold the opinion that this case might be labeled as an atypical pattern of de Winter sign primarily manifesting as prominent T waves in the leads V1–V3 and J point depression in the leads V4 and V5. In other terms, T wave changes and J point depression in this patient did not concur on the same precordial derivations as usually expected, yet emerged in a consecutive manner [1]. Possibly owing to the subtle and intricate ECG findings in the case,
there is reportedly a missed STEMI diagnosis on admission [1]. Fortunately, the case seems to have a spontaneous reperfusion of his culprit coronary artery soon after hospitalization [1].

In the clinical context, evolution of atypical de Winter sign might be due to certain anatomical factors or pre-existing ECG changes, and signifies a broad range of changes in the pattern and predilection site of the classical de Winter criteria [2]. For instance; an atypical de Winter sign might present with widespread, inferior or inferolateral ST segment or J point depressions, and might not necessarily lead to usual changes in the lead aVR [2]. Therefore, definition of atypical de Winter sign has not been uniform so far potentially creating a substantial diagnostic confusion as compared with its classical counterpart [2]. In this context, we previously reported an atypical de Winter sign (in a young male patient) that had a strong analogy to the ECG findings of left main coronary artery (LMCA) stenosis (presenting with a widespread ST segment depression that proved to be due to the acute left anterior descending [LAD] artery occlusion on coronary angiogram [CAG]) [3]. Based on our observations, there might be two common ECG patterns of atypical de Winter sign that might mandate emergent CAG as well:

— Widespread ST segment depression (a potential mimic of critical LMCA stenosis);
— J point depression in at least two contiguous leads (regardless of their location and other accompanying manifestations including T wave changes, etc.).

Second, classical de Winter sign and characteristic ST segment elevation in the precordial leads might arise in an alternating fashion in certain de Winter cases particularly in the pre-reperfusion setting [2]. Moreover, intermittent episodes of ST segment elevation appear to be more frequent in those with an atypical de Winter sign [2]. Accordingly, we wonder whether the patient [1] had persistent de Winter sign (namely static form) [2] before the resolution of his pain.

Finally, gradual resolution of the patient’s chest pain after his admission potentially suggests a spontaneous reperfusion of the LAD artery [1]. Interestingly, the subsequent ECGs were reported to be similar to the initial ECG [1]. This denotes that atypical de Winter sign might possibly persist for some time even after reperfusion of the associated coronary artery. Therefore, one should not draw firm conclusions on the reperfusion status prior to CAG exclusively based on the evaluation of this ECG phenomenon. However, transition to the characteristic subacute STEMI pattern eventually ensues mostly with the evolution of pathologic Q waves on ECG [4] (as evident on the second day and predischarge ECGs of the patient [1]).

In summary, de Winter sign, besides its classical form, might also present with a variety of atypical patterns potentially rendering the evaluation of STEMI even more challenging [2,3]. In this context, there exists an absolute necessity to fully outline the ECG features and practical implications of these atypical patterns in the clinical setting.
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Timely recognition of acute coronary occlusion in patients presenting without ST-segment elevation: a major clinical challenge. Author’s reply

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Acute coronary occlusion leads, when prolonged, to irreversible myocardial necrosis, reduced LV systolic function and poor clinical outcomes. Timely recognition of the full spectrum of patients presenting with suspected acute myocardial infarction (AMI) who have acute coronary occlusion remains a major clinical challenge [1].

Current guidelines do not recommend routine emergent angiography and revascularization for the patients with suspected non-ST elevation MI (NSTEMI) at presentation since the absence of ST-segment elevation is supposed to indicate lack of total epicardial coronary occlusion and therefore does not warrant emergency myocardial reperfusion [2]. NSTEMI patients initially undergo risk stratification and referral for an early invasive strategy based on age, troponin elevation, ECG changes and clinical/hemodynamic status [2]. Given that NSTEMI incidence increases and considering the fact that despite contemporary management there remains unmet clinical need to reduce adverse cardiovascular events in this patient population, improved identification of the high-risk patients who may benefit from expedited angiography and revascularization is needed. The subgroup of patients with suspected NSTEMI who have acute coronary occlusion falls into this category [1].

There is a broad spectrum of 12-lead surface ECG changes, other than classical ST-segment elevation, that can accompany acute coronary occlusion and clinicians need to be aware of. ST-
segment elevation in lead aVR, De Winter pattern, Wellens’ sign and ST depression in precordial leads V1–V3 should lead to recording of posterior leads V7, V8, and V9 represent high risk ECG patterns suggestive of acute coronary occlusion [1]. Adjunctive imaging with bedside echocardiography [3] and monitoring with serial ECGs [4] have been proposed to improve sensitivity for acute coronary occlusion diagnosis.

Our case report of a young man who presented with chest pain and an ECG showing hyperacute T waves in leads V1-V3 and de Winter pattern in leads V4-V5 represents a classic example where atypical ECG patterns can cause confusion to the clinician and lead to false therapeutic pathways. Whether this ECG pattern represents a combination of two different ECG patterns (de Winter and hyperacute T waves) or an atypical de Winter sign as Yalta et al. believe [5], is difficult to say. However, someone can easily realize that nowadays, in the era of multiple emerging sophisticated cardiac tests, even though the ECG does not appear so ‘sexy’, it still represents a very useful bedside diagnostic tool for the clinicians and thorough analysis of it is a prerequisite for good clinical practice.

Collection and big data analysis of the globally massive number of ECGs, that are digitally acquired in patients with suspected ACS who subsequently undergo coronary angiography and application of deep learning algorithms would possibly lead to an efficacious identification of those patterns (such as de Winter sign and its atypical forms) that are associated with acute coronary occlusion [1].

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