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Wolff-Parkinson-White syndrome and de Winter patterns; An implication for paying special attention to electrocardiogram

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Case Report

Abstract

BACKGROUND: Despite recent advances in diagnostic techniques in cardiology, electrocardiography (ECG) has yet remained the first and corner stone of detecting emergency cardiac events including myocardial infarction (MI). There are some ECG findings which are considered as equivalents to MI. De Winter ST-T wave pattern is one of the important ECG findings which is thought to be related to left anterior descending artery occlusion. However, the coexistence of this ECG pattern with other ECG abnormalities are not reported widely. In this report, we discussed a unique case of de Winter ST-T wave pattern in a patient with Wolff-Parkinson-White (WPW) syndrome for the first time.

CASE REPORT: A 43-year-old man was referred because of an intermittent typical chest pain. The patient had no cardiovascular risk factor, and was not on any medication; laboratory tests showed elevated and raising troponin I. The first ECG showed pre-excitation (WPW) as well as de winter pattern. According to patient's symptoms and suggestive ECG for probable left anterior descending (LAD) occlusion, emergent angiography was scheduled. The coronary angiography revealed sever LAD artery occlusion. The patient was symptom free after successful percutaneous coronary intervention, and was discharged on medication. The patient remained asymptomatic in 1-year follow-up period.

CONCLUSION: Presence of de Winter ST-T changes with other ECG abnormalities is a rare issue, and here we addressed the first case of WPW and de Winter. The physicians should be aware that ECG changes in patients with WPW should not be interpreted as de Winter ST-T changes and vice versa.

Keywords: Wolff-Parkinson-White Syndrome, Myocardial Infarction, Electrocardiography, Coronary Vessels

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Introduction

Myocardial infarction (MI) is one the most important cardiac emergencies, and ST-elevation myocardial infarction (STEMI) is a well-known electrocardiographic (ECG) pattern of this cardiac disorder. There are important STEMI equivalents including isolated posterior MI, Wellens syndrome, left bundle branch block (LBBB), and de Winter ST-T wave complex.[1]

De winter pattern is an important electrocardiographic pattern which can lead to large myocardial ischemia if left undiagnosed.[2] Although de Winter ST-T wave pattern is not always related to left anterior descending (LAD) artery occlusion, but it is noteworthy to always pay attention to this ECG finding in symptomatic patients.[3]

This electrocardiographic pattern is defined as 1 to 3 mm up-sloping ST segment depression at J point in precordial leads, followed by a tall and positive symmetrical T wave in addition to normal QRS duration, and 1 to 2 mm ST segment elevation in augmented vector right (aVR) lead. This pattern has been associated with proximal LAD occlusion.

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This condition is usually developed 90 minutes after developing symptoms, and will resolve after angiographic intervention of occluded vessel.[4] Although this ECG pattern is not as common as other STEMI equivalents, and is reported in 2% of patients presented with acute MI, however, it may be misdiagnosed as a non-specific revisable ischemia, and tend to delay reperfusion therapy.[4-6]

De Winter ST-T wave pattern is not commonly seen with other electrocardiographic abnormalities. In the present report, we discussed a case of concomitant de Winter ST-T pattern and Wolff-Parkinson-white (WPW) in a patient referred due to cardiac chest pain.

Case Report

A 43-year-old non-athlete man patient was referred to Cardiac Emergency Unit due to an intermittent typical chest pain from 2 days before. The chest pain severity was grade III according to Canadian Cardiovascular Society Angina Grading Scale. The "at-rest" chest pain was started 40 minutes prior to admission, and continued without any other symptoms as shortness of breath or dyspnea. The patient had no cardiovascular risk factor, and was not on any medication.

Laboratory tests showed elevated and raising troponin I (TPI) levels (TPI of 40.2 ng/l at admission time and 1524 ng/l 3 hours later, normal range: ≤ 19 ng/l). Furthermore, the laboratory results revealed dyslipidemia [triglyceride: 72 mg/dl, cholesterol: 222 mg/dl, high-density lipoprotein (HDL) cholesterol: 47 mg/dl and low-density lipoprotein (LDL) cholesterol: 151 mg/dl]. The first ECG showed pre-excitation WPW as well as de Winter pattern (Figure 1).

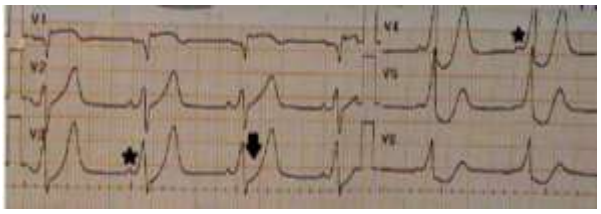

Figure 1. Pre-percutaneous coronary intervention electrocardiography of the patient. The black star shows the delta wave and shortened PR. The black arrow shows upsloping ST segment elevation and tall T wave.

According to patient's symptoms and suggestive ECG for probable LAD occlusion, emergent angiography was scheduled. The coronary angiography revealed sever LAD occlusion (Figure 2). Diagonal, left circumflex and left main arteries were normal, left and right coronary artery had significant lesion at mid part. The patient was symptom free after successful ballooning.

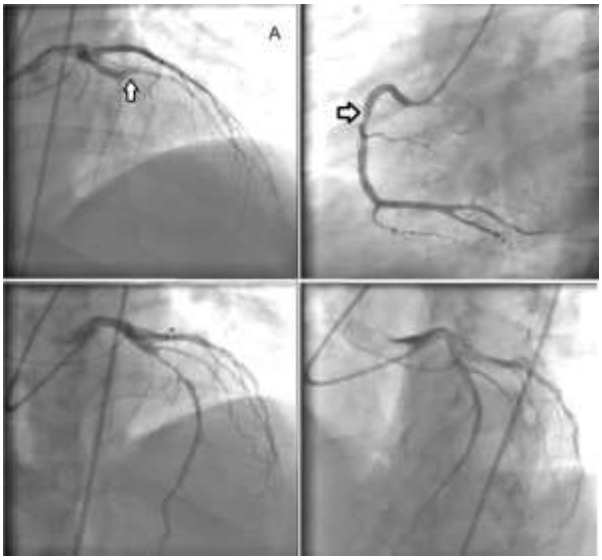

Figure 2. The angiography shows: A. Left anterior descending artery (cut off at mid-part just after first diagonal pointed with arrow); B. Right coronary artery (significant lesion at mid-part pointed with arrow); C. Significant tubular lesion after winning and predilation; D. Successful stenting.

The ballooning was performed by use of guiding catheter Judkins left 6-3.5, and workhouse Guidwire Runthrough Hypercoated was used to pass the lesion. Then semicopliant balloon used for dottering and pre-dilatation of the lesion. After this step, the Resulut Onyx stent 3*32 mm was deployed, and post-dilatation by non-compliant balloon (Apollo 3*20 mm) was done. The post-percutaneous angiography ECG indicated the absence of de Winter pattern (Figure 3). The patient was discharged healthy and aspirin, clopidogrel, atorvastatin, carvedilol, spironolactone, and captopril were prescribed. The patient remained asymptomatic in 1-year follow-up period.

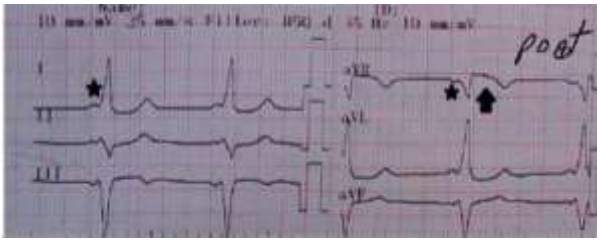

Figure 3. Post-percutaneous coronary intervention of the patient. The black star shows the delta wave and shortened PR. The black arrow shows ST segment elevation in aVR lead.

Discussion

When it comes to acute coronary events, obtaining a standard ECG is the first and tire action in every medical center. Since 1970, scientists have tried to relate different ECG changes to various medical conditions.[7] De Winter ST-T wave complex is a good example, which can predict the coronary involvement in a symptomatic patient. In 2008, de Winter et al. proposed a new ECG pattern in their patients who had proximal LAD occlusion without ST segment elevation.[4] Since then, the de winter ST-T wave changes became popular, and were used as a diagnostic clue for LAD occlusion. In order to better understanding of WPW and de Winter patterns, it will be noteworthy to briefly summarize the differences. During the WPW pattern, negative T waves will be seen while the de Winter will show upright T waves as well as ST segment depression.[8] The delta wave may be a good differentiating clue for diagnosis. The antegrade conduction which will further lead to preexcitation of ventricles and data wave formation. It has been reported that patients with preexictation are more likely to develop arrhythmias including atrial fibrillation, heart failure, and even sudden cardiac death.[9] The next difference is within the QRS segment. The QRS may become broad in WPW while the QRS complex in de Winter is usually normal. In the presence of ST and T wave changes, these changes may be opposite of the positive delta wave. However in de Winter, negative changes of ST segment will be seen with positive and symmetrical T wave.

As mentioned before, de Winter pattern can be seen in different clinical settings including LAD occlusion. A recent meta-analysis reported a weak evidence of the accuracy of this ECG pattern as it can be seen in other clinical settings including hyperkalemic STEMI.[10] Moreover, it has been reported that patients with de Winter ST-T wave pattern can show Wellens syndrome. Wellens syndrome, inverted or biphasic T wave changes in leads V_2 and V_3, is indicative of chronic LAD stenosis.[11] Concomitant de Winter ST-T wave complex with other ECG abnormalities have not commonly been reported. De Winter ST-T wave complex may also indicate occlusion in different parts of LAD. The occlusion may be seen in proximal LAD or even after the first septal perforator.[6,12,13] The pattern has been associated with ventricular fibrillation cardiac arrest after catheterization or defibrillation; although it has not been previously reported with WPW pattern.[5,14] The WPW is a rare disease which has been reported to be seen in 0.5% of patients with sudden cardiac death.[15] A portion of patients with WPW may develop sudden cardiac death, and many may die at rest. It has also been reported that ablation of accessory pathway may not reduce the risk of sudden cardiac death to zero percent.[15] The WPW pattern may simulate or even mask MI. The Q and ST-T waves are masked by delta wave and ST-T changes in WPW.[16] In our patient, despite WPW pattern, we decided to relay on presence of de Winter pattern, which is considered as an equivalent for MI, and decided to perform angiography with the idea of possible LAD occlusion. The physicians should always keep in mind that ECG changes in patients with WPW should not be interpreted as de Winter ST-T changes and vice versa. Although treatment of WPW in such cases is controversial,[17] however, our patient did not agree to undergo any electrophysiological study, and decided to have routine follow-ups.

In the present report, we discussed the first case of de Winter ST-T wave pattern with WPW syndrome. This case demonstrated the importance of performing angiographic studies in patients with de Winter ST-T pattern in order to roll out LAD occlusion. Presence of other ECG abnormalities including WPW should not delay the diagnosis of coronary artery occlusion, and on the other hand, searching for other ECG abnormalities and planning appropriate management in these patients seems to be necessary.

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None.

Conflict of Interests

Authors have no conflict of interests.

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