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Thrombolytic therapy in a patient with chest pain with de Winter ECG pattern occurred after ST-segment elevation: A case report

Weiwei Xu, M.D. [a,*], Liaohang Xu, M.D. [a], Jiren Peng, M.D. [a], Shiwei Huang, M.D. [b]

[a] Department of Cardiology, Affiliated Dongyang People's Hospital of Wenzhou Medical University, Dongyang, Zhejiang Province 322100, PR China
[b] Department of Cardiology, Wenzhou People's Hospital, Wenzhou, Zhejiang Province 325000, PR China

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ABSTRACT

The de Winter electrocardiogram (ECG) pattern may signify proximal left anterior descending artery (LAD) occlusion and was suggested to be managed as ST-segment elevation myocardial infarction (STEMI) equivalent for urgent angiography and reperfusion therapy. However, cardiac catheter laboratory is not readily or timely available in every hospital. When timely percutaneous coronary intervention (PCI) is not available, thrombolytic therapy can be considered in patients with ongoing ischemia symptoms. Here, we present a case of a successful thrombolytic therapy with de Winter ECG pattern occurred after ST-segment elevation in a scenario which the catheter laboratory was unavailable.

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Introduction

The de Winter electrocardiogram (ECG) pattern consisting of junctional ST-depression with tall symmetrical T-waves in patients with acute chest pain has been related with occlusion of the proximal left anterior descending artery (LAD) [1]. This pattern was suggested to be managed as ST-segment elevation myocardial infarction (STEMI) equivalent for urgent angiography and reperfusion therapy. However, cardiac catheter laboratory is not readily or timely available in every hospital. When timely percutaneous coronary intervention (PCI) is not available, thrombolytic therapy can be considered in patients with ongoing ischemia symptoms. So far, the question of whether de Winter ECG pattern can be treated with thrombolytic therapy is unclear.

Case report

A 66-year old man without a history of cardiac disease was admitted to the emergency department for acute onset chest pain. The first electrocardiogram taken 30 min after symptom onset (Fig. 1A) showed an acute anterior ST-segment elevation myocardial infarction. He was treated with aspirin, clopidogrel, atorvastatin and nitroglycerin, and hesitated about the urgent reperfusion therapy recommended by the doctor. The second ECG (20 min after the first ECG) was performed and revealed junctional ST-depression with tall symmetrical T-waves in leads V2–V5 and a slight ST segment elevation in Lead aVR, which was compatible with the de Winter ECG pattern (Fig. 1B). At the same time, he finally agreed to receive urgent reperfusion therapy. Unfortunately, cardiac catheterization laboratory was occupied and might not be timely available. Based on the persistent myocardial ischemia symptom, thrombolytic therapy with reteplase (18 mg administered over 2 min by intravenous injection, followed 30 min later with a second 18 mg) was immediately administrated with de Winter ECG pattern. His symptom completely disappeared 1.5 h later and ECG showed resolution of the de Winter ECG pattern and approximate normal QRS-T waves (Fig. 1C). The next day, coronary angiography showed a plaque rupture in the proximal left anterior descending artery (LAD) with TIMI 3-graded flow (Fig. 2A). The lesion was treated by implantation of a drug-eluting stent (Fig. 2B). Troponin T and creatine kinase-myocardial band levels observed approximately 24 h after symptom onset were 2.62 ng/ml and 104.0 U/l, respectively. Subsequent echocardiography revealed normal left ventricular systolic function, and no complications occurred during hospitalization.

Discussion

A few ECG patterns without true ST elevation, referred to as “STEMI equivalents”, reflect coronary sub-occlusion or occlusion with imminent or ongoing transmural ischemia, should probably be referred for coronary angiography with the possibility of urgent intervention. One such STEMI equivalent, which the electrocardiographic pattern consists of junctional ST-depression with tall symmetrical T-waves in the precordial leads in patients with acute chest pain, known as “de Winter ECG pattern”, has been related with the occlusion of the proximal LAD [1]. Although this pattern was suggested to be managed as STEMI equivalent, it was not mentioned in recent guidelines by the European Heart Society and the American Heart Association. Yet, in the discussion of

* Corresponding author.
E-mail address: xww200911@163.com (W. Xu).

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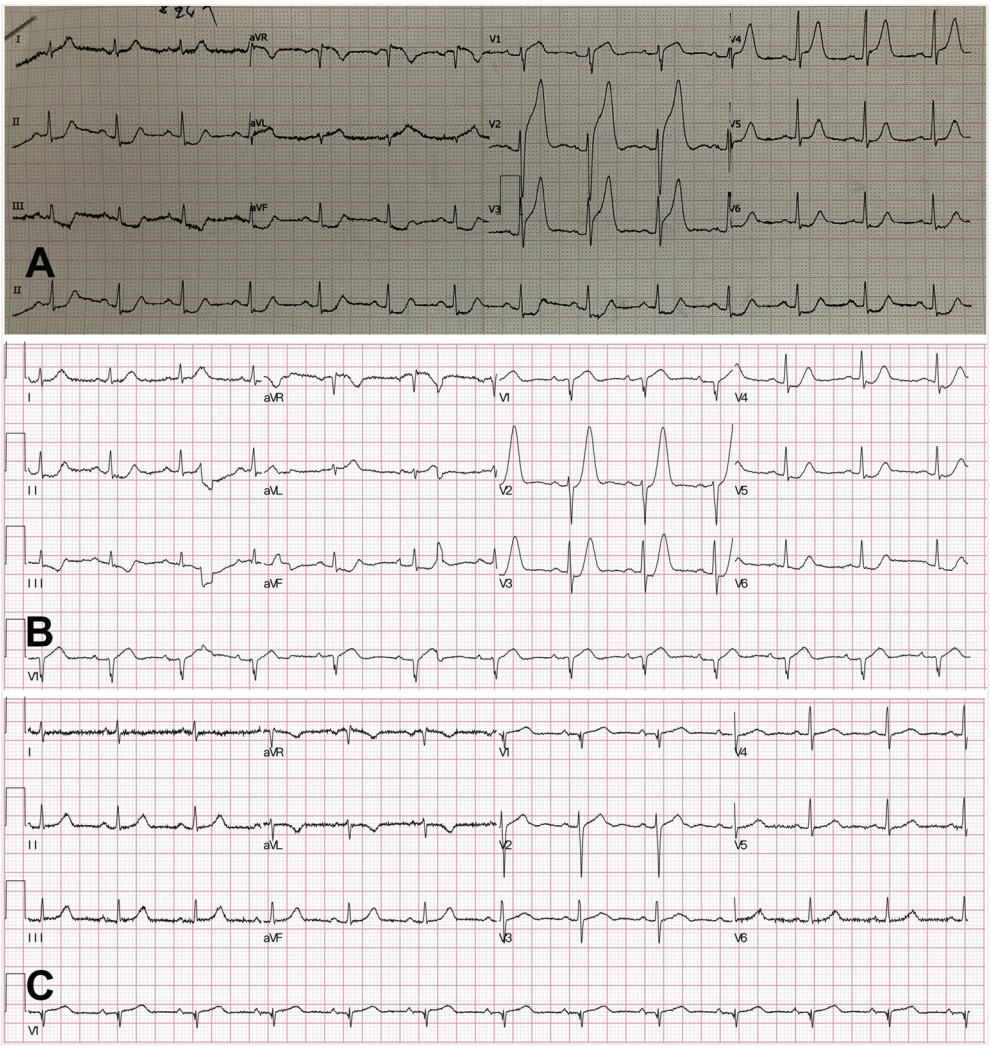

Fig. 1. (A) ECG recorded on arrival in the emergency department demonstrated ST-segment elevation in leads V1–4 and aVR, with ST depression in inferior leads. (B) The second ECG (20 min after the first ECG) showed de Winter ECG pattern. (C) ECG recorded 1.5 h after the thrombolytic therapy showed resolution of the de Winter ECG pattern and approximate normal QRS-T waves.

the recent Fourth Universal Definition of Myocardial Infarction, the de Winter ECG was mentioned as one of several atypical electrocardiographic manifestations of acute myocardial ischaemia induced by LAD artery occlusion [2].

Urgent reperfusion therapy with primary percutaneous coronary intervention or thrombolysis should be provided for the management of STEMI. When timely PCI is not available, thrombolytic therapy can be considered in patients with ongoing ischemia symptoms suggestive of

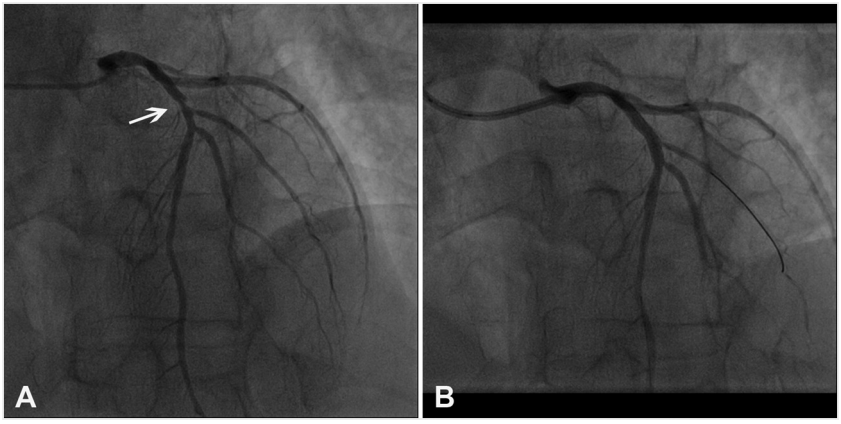

Fig. 2. (A) Coronary angiography revealed a plaque rupture in the proximal left anterior descending artery (white arrow) with TIMI-3 flow. (B) The lesion was treated by percutaneous coronary intervention with a drug-eluting stent.

acute myocardial infarction. So far, the question of whether de Winter ECG pattern can be treated with thrombolytic therapy in an area where cardiac catheter laboratory is not readily or timely available is unclear. In 2018, Rao et al. first reported two patients with de Winter pattern benefited from the thrombolytic therapy [3]. Here, we present a case of thrombolytic therapy with de Winter ECG pattern occurred after ST-segment elevation in a scenario which the catheter laboratory was unavailable. Thrombolysis in this case was significantly effective, which given relative low level of troponin elevation and absence of Q waves on subsequent ECG. Since the de Winter ECG pattern is an infrequent finding, large clinical trials of thrombolytic therapy with this pattern are difficult to obtain in a short period of time. Our clinical case may be a reference to solve the dilemma in the management of a patient with de Winter ECG pattern in a hospital that is unable to access timely PCI.

The de Winter ECG pattern was originally described by de Winter et al. as static, persisting from the time of initial recording at presentation until after angiographic confirmation of LAD occlusion [1]. In 2014, Goebel et al. described a case of the de Winter pattern evolving to an STEMI ECG pattern within hours of presentation [4]. Recently, Lam et al. [5] reported a case of the ST-segment elevation in the presenting ECG evolved spontaneously to the de Winter pattern before any coronary intervention, which was similar to our case. Zhao et al. observed the de Winter pattern after ST-segment elevation and spontaneous coronary recanalization of total proximal LAD occlusion in coronary angiography [6]. Thus, it can be speculated that de Winter ECG pattern may be a transient and intermediate state of ongoing myocardial ischemia between sub-occlusion and total occlusion of the artery due to acute progressive coronary thrombosis. Furthermore, characteristics of the patients with de Winter pattern were younger, frequently had hypercholesterolemia and majority had isolated LAD artery disease without any significant coronary lesions elsewhere [1], which strongly imply that acute coronary artery thrombosis after plaque rupture resulting in vascular occlusion. The aforementioned argument may be the theoretical basis for supporting thrombolytic therapy to de Winter ECG pattern.

In conclusion, we believe that when timely percutaneous coronary intervention cannot be available, thrombolytic therapy may be considered in patients (without contraindications) who suffer from ongoing ischemia symptoms, and with convincing de Winter ECG pattern, especially which transforms from ST-segment elevation.

Declarations of Competing Interest

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