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Timely lifesaving recanalization in two cases with De winters T wave: Case series

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ABSTRACT

Acute coronary syndrome (ACS) is one of the major life-threatening conditions encountered on daily basis in the emergency department and one of the leading causes of death in middle and old age with predominant symptom as chest pain. ST elevated myocardial infarction (STEMI) can be detected early by a vital assessment tool called Electrocardiogram (ECG). De Winter T-wave ECG pattern is a rare incidence which is often unrecognized by physicians, first described by Robert J De winter and colleagues in 2008 as STEMI equivalent which signifies left anterior descending coronary artery (LAD) occlusion. This case series highlights the use of thrombolytic agents in absence of STEMI to prevent further myocardial damage and improve the patient's outcome much before percutaneous coronary intervention (PCI). Coronary revascularization on an emergency basis reestablishes coronary blood flow and reduces mortality and hospital stay. The thrombolysis was successful and the patient symptoms improved along with reversal of initial ST-segment and T-wave changes. LAD was later confirmed by coronary angiography and appropriate cardiac interventions were done.

Keywords: De winter sign, Inj. Reteplase, Thrombolysis, ACS (Acute Coronary Syndrome), Chest pain

1. INTRODUCTION

Acute coronary syndrome (ACS) affects roughly 3 out of every 1000 people worldwide, with an increasing incidence rate. Patients with abrupt onset chest discomfort are frequently seen by emergency department physicians. The diagnosis is greatly influenced by clinical symptoms and biomarkers of cardiac necrosis. Electrocardiogram (ECG) proves to be an early assessment and diagnostic imaging tool to help identify ST elevated myocardial infarction (STEMI) showing persistent uplift ST-segment elevation in two or more contiguous relevant leads (Yuanyuan et al., 2020). ST-segment elevation in two continuous leads and acute chest pain suggest myocardial ischemia (Coppola et al., 2013). However, atypical ECG changes as seen in STEMI equivalents which was first described by Dewinter et al., (2008) as up sloping ST depression (> 1mm at J point) in the precordial leads V2-6, plus leads I and II along with Peaked anterior T waves, with the ascending limb of the T wave

commencing below the isoelectric baseline and ST elevation in a VR > 0.5mm (D Winters T Wave, Wellen's syndrome, ST elevation in lead a VR, Left Bundle Branch Block) are the real challenge for diagnosis (Dewinter et al., 2008). This condition requires urgent intervention and is suggested to be managed as STEMI equivalent with early referral for cardiac catheterization and primary PCI, in order to ensure appropriate reperfusion. But the dilemma arises with the use of thrombolytic agents in the management protocol.

We here report a case series of two patients with atypical ECG changes (De winter's T wave) who presented to the emergency department and were managed and stabilized with timely thrombolytic therapy by the emergence providers.

2. CASE PRESENTATION

Case 1

A 70-year-old male patient presented to the emergency room with a history of sudden retrosternal chest pain radiating to the back and left arm, which decreased after taking a sublingual Tablet of Isosorbide dinitrate (5mg). It has been associated with sweating and uneasiness for 1.5 hours. On presentation, his airway was patent and his respiratory rate was 18/minute with 98% saturation on room air. His pulse rate was 100 beats per minute, his blood pressure was 110/80 mm hg, GCS-15/15 and his random blood sugar was 140 mg/dl. He has been a known case of hypertension for eight years on regular medication, tablet Telmisartan 40 mg once daily. He had no history of giddiness, loss of consciousness, addictions, diabetes mellitus and bronchial asthma, previous history of ischemic heart disease or consumption of blood thinners. A 12-lead ECG was done, suggesting an up-sloping ST depression (D winters T wave) in lead V2 to V6 (Figure 1).

Investigations

Blood investigation of the patients on presentation (Table 1).

Table 1 Blood investigation on presentation

Name of Investigation	Results	Normal Range
CKMB	489 U/L	0-16U/L
Highly sensitive troponin I	435600pg/ml	1.5- 30000pg/ml
Serum creatinine	1.5mg/dl	0.66-1.25mg/dl
Urea	31mg/dl	9-20 mg/dl

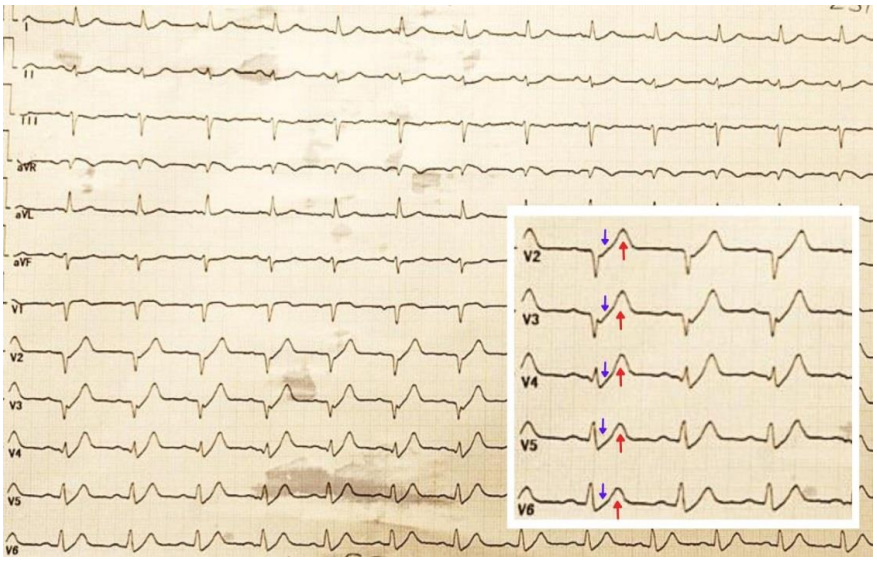

Figure 1 ECG on presentation with up sloping ST depression in lead V2-V6 (Blue arrow-up sloping ST depression at J-point, red arrow-Hyper acute T waves)

This patient was administered Tablet Aspirin 300 mg, Tablet Clopidogrel 300 mg, tablet atorvastatin 80 mg and tablet Isosorbide Dinitrate (5 mg) sublingually and was thrombolysis with Injection Reteplase 10-unit bolus. ECG was done as in Figure 2, followed by a second dose of injection Reteplase 10 units after 30 minutes and ECG was done after thrombolysis and 12 hours.

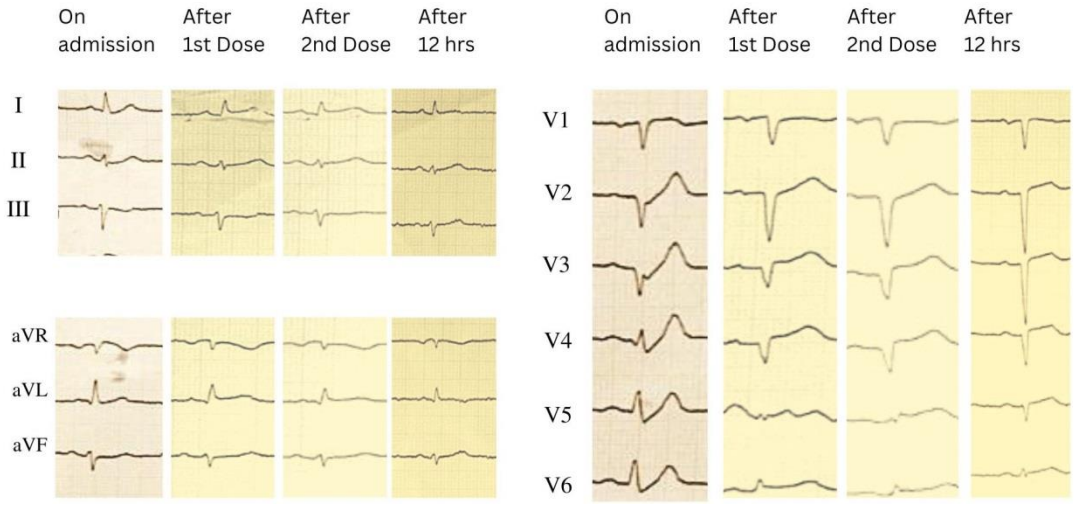

Figure 2 Comparative ECG on admission, after 1st dose of injection reteplase 10 UNITS IV, after second dose of injection reteplase 10 units IV, after 12 hours of thrombolysis-resolution of De winter pattern in inferior leads

This patient was shifted to Cardiac ICU, where he was treated with low molecular weight heparin 60 mg subcutaneously twice a day 12 hours after thrombolysis along with a dual antiplatelet agent and statin. Coronary angiography was done after 24 hours (Figure 3). This indicated a recanalized left anterior descending artery with residual thrombus from the left main coronary to the left anterior descending artery and Thrombolysis in Myocardial Infarction (TIMI) grade II flow. Presence of thrombus from left main coronary to left anterior descending artery patient was advised injection tirofiban infusion followed by check angiography was done (Figure 3). The patient underwent coronary artery bypass graft surgery because of a significant lesion in the left main coronary artery.

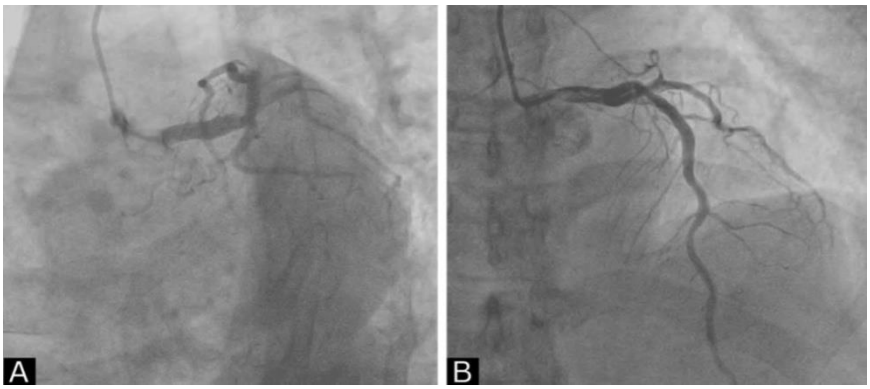

Figure 3 A) Significant lesion in distal left main coronary artery B) After administration of injection Reteplase

Case 2

A 52-year-old male presented to the emergency room with a history of retrosternal chest pain which was sudden in onset, radiating to the back and associated with sweating, pulse and uneasiness for 2 hours. On presentation, his airway was patent. His respiratory rate was 20 per minute with a saturation of 95% on room air. His pulse rate was 90 per minute and 120/70 mm Hg of blood pressure, GCS-15/15 and random blood sugar-170 mg/dl. There was a history of hypertension for two years with regular medication of tablet Amlodipine 5 mg twice daily. History of chest pain since eight months there was no history of giddiness, loss of consciousness, any addictions, diabetes mellitus, bronchial asthma or consumption of blood thinners. A 12 lead ECG was done, suggesting an up-sloping ST depression (De winters T wave) in lead V3 and V4 (Figure 4).

The patient was administered a tablet aspirin 300 mg, a tablet clopidogrel 300 mg, a tablet atorvastatin 80 mg and a tablet isosorbide dinitrate 5 mg sublingually and was thrombolysis with an injection reteplase 10 unit IV bolus followed by another ten units IV after 30 minutes followed by ECG (Figure 5).

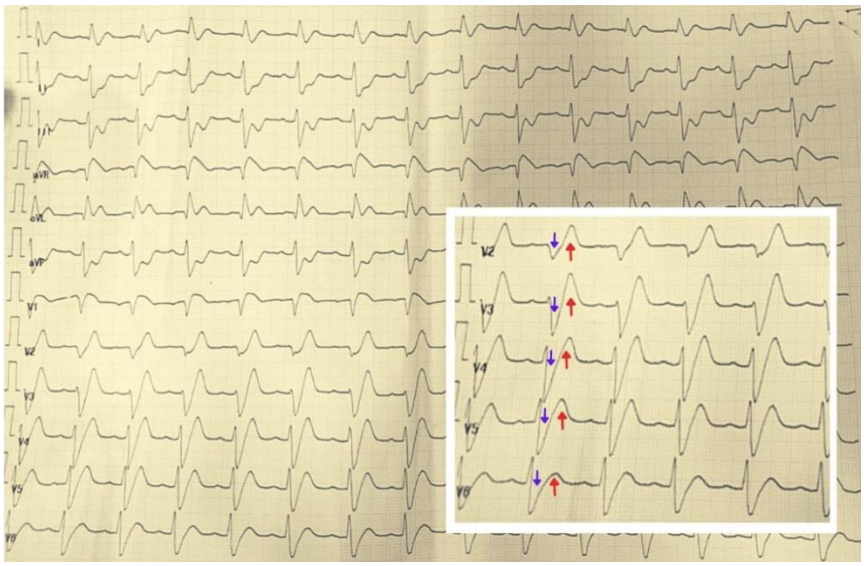

Figure 4 ECG on presentation with up sloping ST depression in lead V2-V6 (Blue arrow-up sloping ST depression at J-point, red arrow-Hyper acute T waves)

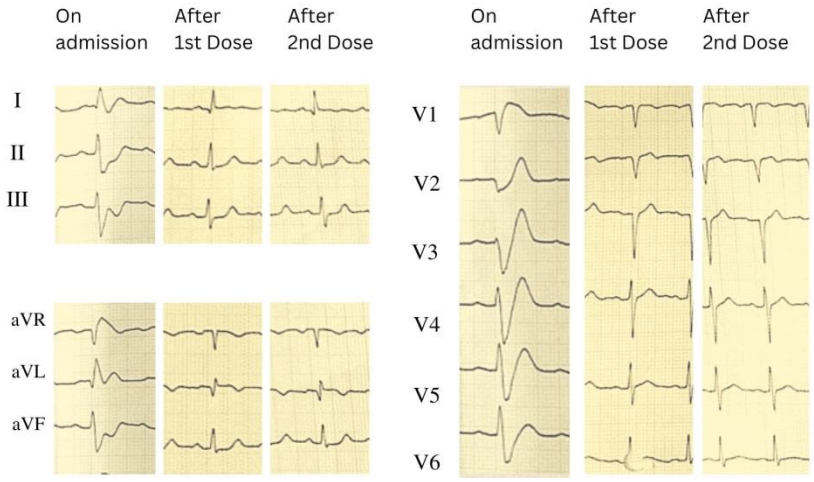

Figure 5 ECG at admission, after administration of first dose of injection reteplase, after second dose of injection reteplase 10 Units-resolution of De winter pattern in inferior leads

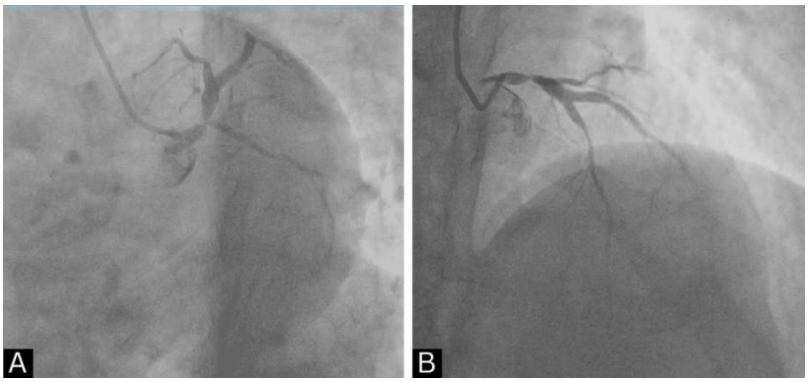

Figure 6 A) left main coronary artery occlusion; B) Angiography suggestive of 90 % stenosis in distal left main coronary artery 90 % stenosis in ostial branch of left anterior descending artery and left circumflex artery and 80 % stenosis in left anterior descending artery

Patient was shifted to the cardiac intensive care unit, where he was treated with an injection of enoxaparin 60 mg subcutaneously twice a day 12 hours after thrombolysis along with a dual Antiplatelet agent and statin; coronary angiography was

done, which was suggestive of occlusion of the left main coronary artery (Figure 6). Due to thrombolysis, TIMI III flow was achieved in LAD. The left circumflex artery and patient were stabilized due to timely successful thrombolysis.

3. DISCUSSION

"STEMI mimics" are less well-known, typically cause treatment delays and have worse results. In 2008, De winter discovered peculiar T waves in the ECG almost consistently represented a proximal left anterior descending blockage. De winter T waves were described as "ECG changes can be seen as up sloping ST segment depression (about 1 to 3 mm) at the J point in the precordial leads, with a persistent hyper acute T wave". This ECG pattern indicates a left anterior descending (LAD) artery obstruction (Mufti et al., 2018; Ozdemir et al., 2015; Wismiyarso et al., 2021). The explanation for De winter syndrome's absence of ST segment elevation is a question. In one study, it was hypothesized that the unusual ECG patterns were related to the development of collateral circulation after trans mural ischemia (Neumann et al., 2019), while in another, it was suggestive that they were caused by a mutation in the Kir 6.2 gene, which controls the activation of sarcolemmal ATP-sensitive potassium (KATP) channels (Li et al., 2000). Rao et al., (2018) and Sedghiani et al., (2020) reported De winter T waves which were successfully thrombolysis with a successful outcome.

4. CONCLUSION

De winter's T wave and MI equivalent should not be neglected and early revascularization should be done to restore blood supply by thrombolysis or coronary stenting for a better outcome for the patient.

Conflicts of interest

The authors declare that there is no conflict of interest.

Financial relationships

All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other relationships

All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Author Contributions

Gajanan N Umalkar–Prime contributor: First person contacts with the case along with work up and treatment modality.
Charuta Gadkari: Case work up and treatment modality
Gajanan Chavan: HOD, Department of Emergency Medicine
Gaurav Sahu: Article editing and review
Akash Lohakare: Article editing and review

Ethical approval

Not applicable

Informed consent

Consent was obtained by all participants in this study.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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