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Successful revascularization of inferior ST-segment elevation myocardial infarction with positive "Dead Man Sign": A case report

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Abstract

This case report outlines the management of a 43-year-old male with no past medical history presenting with inferior ST-segment elevation myocardial infarction and a positive "Dead Man Sign." Prompt administration of antiplatelet therapy and emergent percutaneous coronary intervention led to successful revascularization of the occluded right coronary artery and left anterior descending artery. The patient remained asymptomatic throughout hospitalization and was discharged home with instructions for monthly follow-up for 1 year. Subsequent assessments demonstrated normal echocardiography and Electrocardiography (ECG) findings, indicating favorable cardiac recovery. This case emphasizes the critical importance of rapid recognition and intervention in ST-segment elevation myocardial infarction cases, as well as the significance of the Dead Man Sign as a predictor of the occluded culprit coronary vessels, demonstrating favorable outcomes achievable with timely revascularization strategies.

Keywords

Cardiology, case report, dead man sign, emergency medicine, STEMI

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Introduction

Inferior ST-segment elevation myocardial infarction (STEMI) is a critical presentation of coronary artery disease, characterized by ST-segment elevation in the inferior leads of the electrocardiogram (II, III, aVF). Within this subset, a distinctive electrocardiographic finding known as the "Dead Man Sign" emerges, adding a unique dimension to the diagnostic landscape.[1] This intriguing phenomenon manifests as the absence of ST-segment elevation in lead III, creating a visual resemblance to the silhouette of a supine figure, hence the evocative term "Dead Man Sign."

The "Dead Man Sign" in inferior STEMI poses both diagnostic challenges and significant clinical implications.[2] While the standard presentation involves simultaneous elevation in all three inferior leads, the absence of ST-segment elevation in lead III can be indicative of specific coronary artery involvement or anatomical variations. Recognizing and understanding this electrocardiographic variant is crucial for accurate diagnosis and appropriate management.[3]

The introduction of the "Dead Man Sign" prompts an exploration into its prevalence, clinical significance, and potential impact on patient outcomes.[4] The electrocardiographic intricacies, coupled with the underlying coronary pathology, contribute to the complexity of inferior STEMI presentations. This introduction sets the stage for a comprehensive examination of the "Dead Man Sign," unraveling its nuances within the broader context of acute coronary syndromes and underscoring the importance of meticulous electrocardiographic interpretation in guiding timely and tailored interventions for patients with inferior STEMI.[5]

Case report

A 43-year-old male presented to our emergency department with sudden crushing chest pain persisting for the last 4 h,

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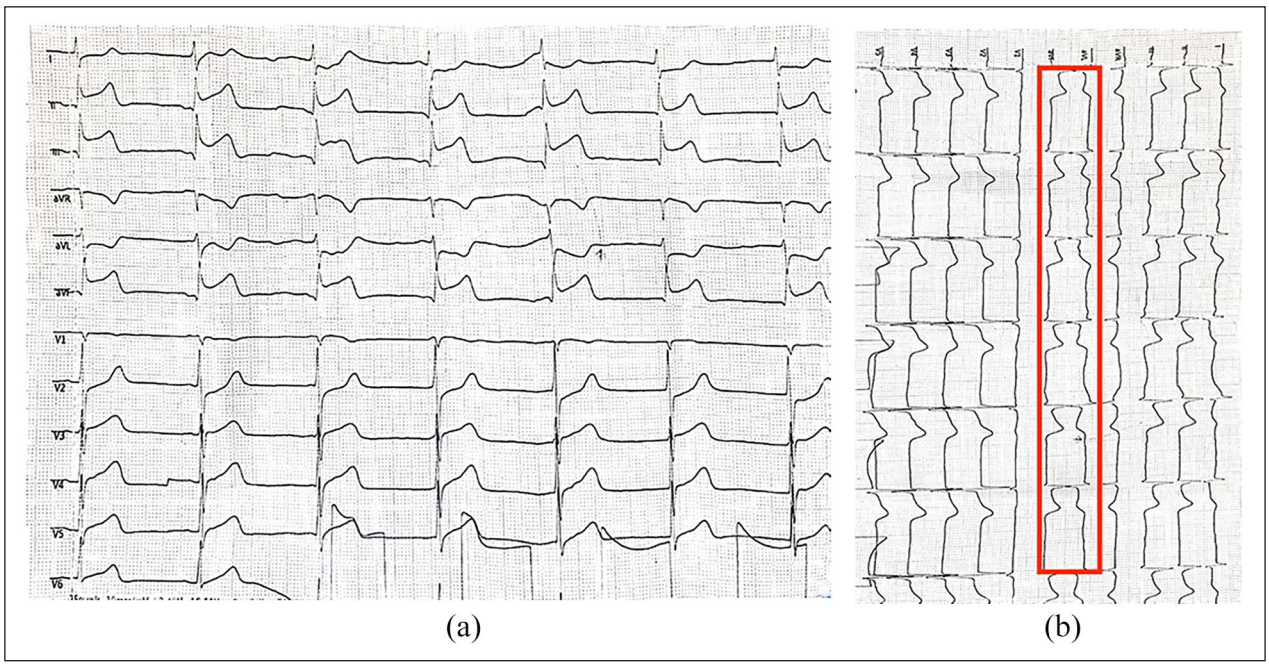

Figure 1. (a) Emergency ECG showing ST segment elevation in leads II, III, aVF, and reciprocal ST segment depression in lead aVL. (b) ECG showing a dead man sign (red rectangle).

radiating to the jaw and right arm. He has no past medical history, is a non-smoker, and does not drink alcohol.

Upon examination, a middle-aged male was found sitting in bed with severe chest pain. He was fully conscious, alert, and oriented to time, place, and person. Cardiovascular, respiratory, and abdominal examinations were unremarkable.

His vital signs were as follows: blood pressure 138/89 mmHg, respiratory rate 18 cycles/min, temperature 37.2°C, heart rate 87 beats/min, and oxygen saturation at 97%.

An emergency ECG revealed ST segment elevation in leads II, III, aVF, and reciprocal ST segment depression in lead aVL (Figure 1(a)). The "Dead man sign" was positive, as shown in (Figure 1(b)).

Immediate action was taken following the activation of the emergency acute coronary syndrome protocol, with the patient receiving aspirin 300 mg, ticagrelor 180 mg, and morphine sulfate 2 mg intravenously. While awaiting transfer to the coronary catheter laboratory, echocardiography showed a normal ejection fraction, no regional wall motion anomalies, normal heart valves, and no pericardial effusion. His serum troponin I was significantly elevated at 5.6 (normal 0.0.04 ng/ml).

Emergency percutaneous coronary intervention (PCI) was performed with a door-to-balloon time of 70 min, revealing total occlusion of the right coronary artery (RCA) with TIMI 0 blood flow (Figure 2(a)) and proximal mid-bifurcational occlusion of the left anterior descending (LAD) artery with TIMI 2 blood flow and normal left circumflex artery (Figure 2(b)). During angiography, the patient developed transient sinus bradycardia, which was managed successfully with the placement of drug-eluting stents. Specifically, Zotarolimus-Eluting Stents (Onyx, Medtronic) measuring 3.5×30 mm were placed in the RCA and LAD, restoring normal blood flow (Figure 3(a) and (b)), without the need for a temporary pacemaker.

He was subsequently transferred to the coronary care unit for strict management and follow-up. One hour post-angiography, his ECG revealed normal sinus rhythm without ischemic changes, indicating successful revascularization (Figure 4).

His medication regimen included aspirin 100 mg once daily, ticagrelor 90 mg twice daily, bisoprolol 5 mg once daily, lisinopril 5 mg once daily, and atorvastatin 80 mg once daily.

During his 2-day admission, he remained pain-free and clinically stable. He was discharged home with instructions for monthly follow-up for 1 year. Subsequent assessments demonstrated normal echocardiography and ECG findings, indicating favorable cardiac recovery.

Discussion

Inferior STEMI with a positive "Dead Man Sign" refers to a distinctive electrocardiographic pattern indicating an ominous prognosis.[1] This pattern, characterized by ST-segment elevation in lead III exceeding lead II, signifies a grave condition often associated with extensive RCA involvement.[6] Recognizing and promptly addressing this presentation is pivotal for optimal outcomes.[2]

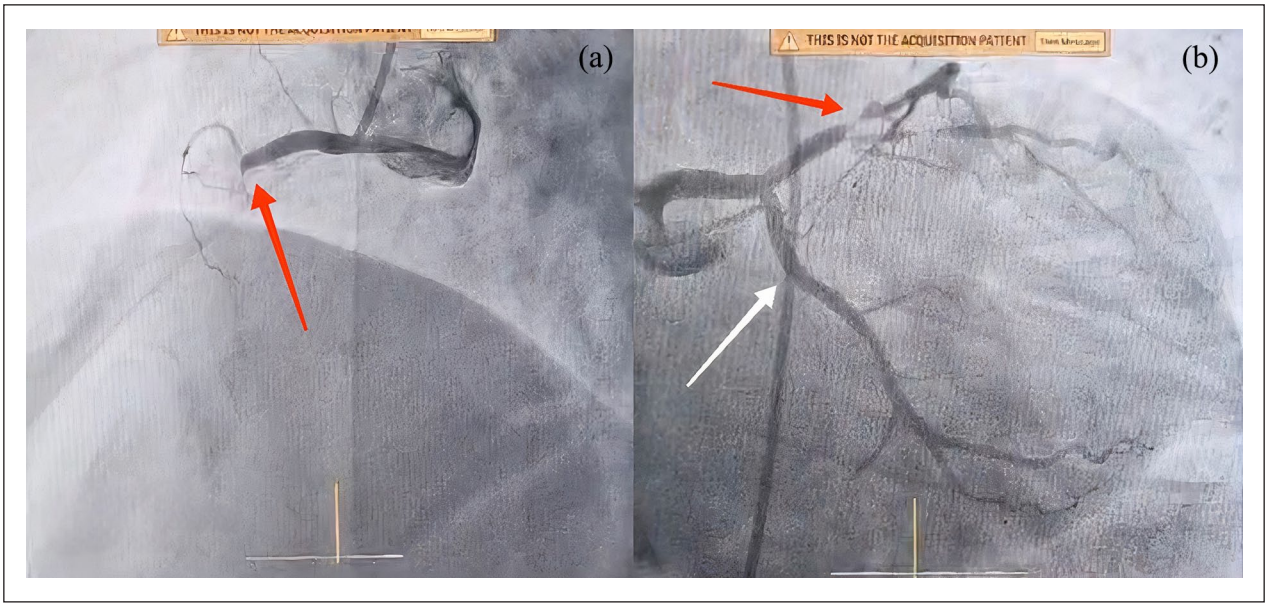

Figure 2. (a) Coronary angiography reveals total occlusion of the right coronary artery (red arrow). (b) Caudal view of coronary angiography, demonstrating mid-bifurcational subtotal occlusion of the left anterior descending artery (red arrow) and normal flow in the left circumflex artery (white arrow).

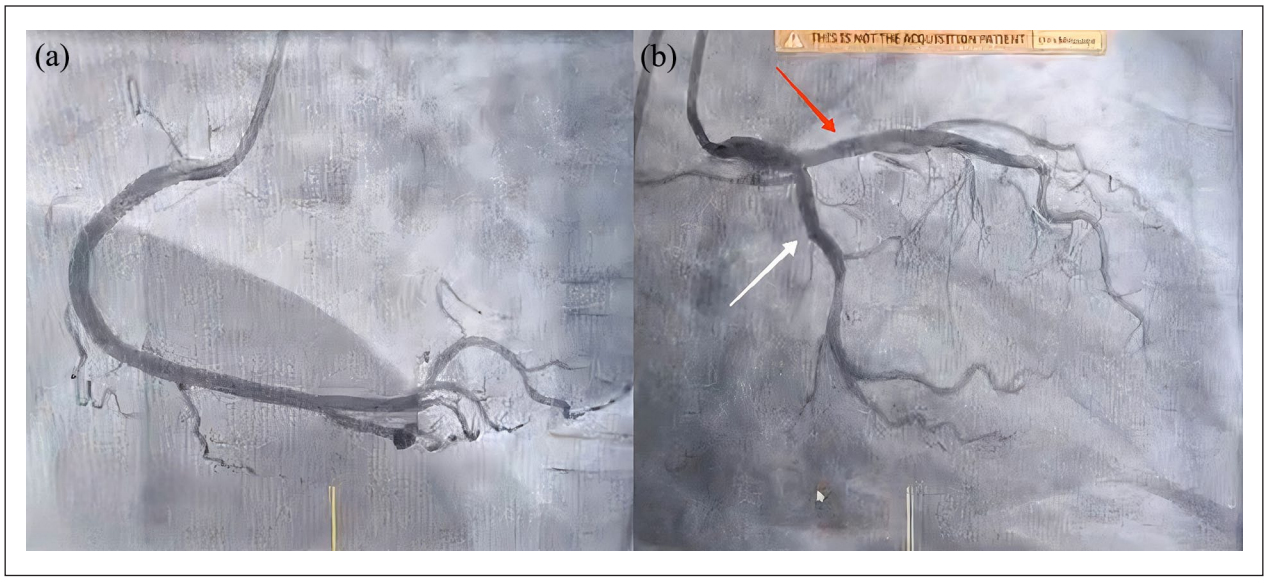

Figure 3. (a) TIMI 3 blood flow in the right coronary artery following stent insertion. (b) Restoration of normal blood flow in the left anterior descending artery (red arrow) post-stent insertion, alongside normal flow in the left circumflex artery (white arrow).

The "Dead Man Sign," resembling the silhouette of a deceased person, is a red flag for a high-risk STEMI. It commonly implies a proximal RCA lesion extending to the inferior and posterior walls of the heart.[6] The significance lies in the potential for extensive myocardial damage, hemodynamic compromise, and increased mortality.

Our case report presents a unique clinical scenario complicated by the presence of proximal mid-bifurcational occlusion LAD with TIMI 2 blood flow, in addition to the Dead Man Sign indicative of extensive RCA involvement. This complexity highlights the importance of considering the multifactorial nature of acute myocardial infarction (AMI) presentations and the need for a comprehensive analysis of electrocardiographic findings.

The electrocardiographic changes observed in our patient, including the Dead Man Sign, reflect the complex relationship between coronary artery anatomy and myocardial perfusion. The Dead Man Sign traditionally correlates with

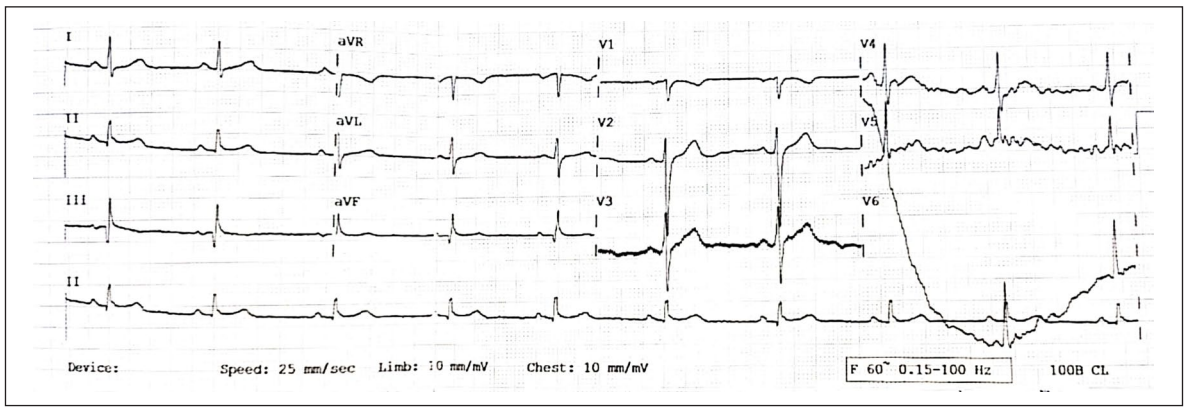

Figure 4. One hour post angiography ECG reveals normal sinus rhythm without ischemic changes.

RCA occlusion.[6] The coexistence of LAD disease introduces additional complexity to the interpretation of ECG findings. In particular, the involvement of the LAD may contribute to reciprocal changes in ECG leads, such as aVL, reflecting the diagonal branch.

Successful revascularization, typically achieved through primary PCI, is the cornerstone of management for this high-risk scenario.[2,3] Dead Man Sign requires a tailored approach to revascularization by addressing both RCA and LAD lesions. The deployment of drug-eluting stents in both vessels aimed to restore normal blood flow and mitigate the risk of recurrent ischemic events.

Timely intervention aims to restore blood flow to the jeopardized myocardium, salvaging viable tissue and improving overall prognosis. The intricate anatomy of the RCA and the complexity of the lesion often demand the expertise of interventional cardiologists.[7]

Moreover, the success of revascularization is contingent on prompt recognition and an organized approach to the "Dead Man Sign." Early activation of the catheterization laboratory is crucial, ensuring minimal ischemic time. The use of advanced imaging techniques, such as intravascular ultrasound or optical coherence tomography, aids in precise lesion assessment, guiding optimal stent placement.[4]

Post-revascularization, vigilant monitoring for complications, including reperfusion injury or arrhythmias, is essential. Hemodynamic stability and serial electrocardiograms guide further management decisions.[5,8] In addition, pharmacological therapies, including antiplatelet agents, anticoagulants, and adjunctive medications, are integral components of the post-PCI care plan.[6]

Conclusion

Inferior STEMI with a positive "Dead Man Sign" represents a critical and challenging clinical scenario. Our case highlights the importance of a thorough evaluation of electrocardiographic findings in the context of AMI, particularly when complicated by multi-vessel disease. By acknowledging the complexity introduced by coexisting coronary lesions, we can better tailor our management strategies to optimize patient care and outcomes. Moving forward, further research is warranted to elucidate the optimal approach to AMI management in cases with concurrent Dead Man Sign and multi-vessel disease, ultimately improving outcomes in this high-risk population.

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Authors contribution

M.H.A.A. Conceptualization, Methodology, Writing – Original Draft; A.A.A.Y. Data curation, Investigation, Visualization; A.Q.M.A. Formal analysis, Writing – Review & Editing, Supervision; H.T.H. Resources, Validation, Project administration.

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Informed consent

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