

Acute Myocardial Infarction with Initially Normal ECG: The Importance of Serial Evaluation

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1. Abstract

1.1. Background: Acute myocardial infarction (AMI) may present with non-specific symptoms and initially normal electrocardiographic findings, leading to potential misdiagnosis and delayed treatment.

1.2. Case Presentation: A 45-year-old previously healthy male presented to the emergency department with central chest discomfort described as burning, initially attributed to gastroesophageal reflux disease (GERD). Initial vital signs were stable, and the first electrocardiogram (ECG) showed no significant abnormalities. Laboratory investigations, including initial cardiac biomarkers, were within normal limits. Despite symptomatic treatment, the patient continued to experience chest discomfort. A repeat ECG performed two hours later demonstrated ST-segment elevation in the anterior leads. Subsequent troponin levels were elevated, confirming the diagnosis of acute ST-elevation myocardial infarction (STEMI). The patient underwent urgent coronary intervention with successful revascularization.

1.3. Conclusion: This case highlights the critical importance of serial ECG and repeated clinical evaluation in patients with persistent chest pain, even when initial findings are unremarkable. Early recognition of evolving myocardial infarction is essential to prevent adverse outcomes.

2. Keywords

Myocardial infarction, normal ECG, misdiagnosis, chest pain, serial ECG

3. Introduction

Acute myocardial infarction remains a leading cause of morbidity and mortality worldwide. While classic presentations are well

recognized, atypical manifestations and initially normal electrocardiographic findings may delay diagnosis. Early ECG changes may be subtle or absent, particularly in the early stages of infarction. Failure to recognize evolving ischemia can lead to catastrophic outcomes.

This report describes a case of acute myocardial infarction initially misdiagnosed due to a normal ECG, emphasizing the importance of serial assessment and clinical vigilance.

4. Case Presentation

A 45-year-old male with no significant past medical history presented to the emergency department complaining of central chest discomfort of two hours duration. The pain was described as burning in nature, non-radiating, and associated with mild nausea. There was no history of diabetes, hypertension, or prior cardiac disease.

On presentation, the patient's vital signs were as follows: heart rate 96 beats per minute, blood pressure 130/85 mmHg, respiratory rate 20 breaths per minute, and oxygen saturation 97% on room air. Physical examination was unremarkable.

An initial ECG showed normal sinus rhythm with no ST-segment changes. Initial laboratory tests, including cardiac troponin, were within normal limits. The patient was provisionally diagnosed with gastroesophageal reflux disease and managed symptomatically.

However, due to persistent chest discomfort, a repeat ECG was performed two hours later, revealing ST-segment elevation in leads V2–V5. Repeat cardiac biomarkers showed a significant rise in troponin levels.

The patient was immediately transferred for urgent coronary angiography, which demonstrated occlusion of the left anterior descending artery. Percutaneous coronary intervention (PCI) was successfully performed with restoration of coronary flow.

The patient's symptoms resolved following intervention, and he was discharged in stable condition with appropriate cardiac medications and follow-up.

5. Discussion

This case illustrates a critical diagnostic challenge in emergency medicine: the occurrence of acute myocardial infarction with initially normal ECG findings. Although ECG is a cornerstone in the evaluation of chest pain, its sensitivity in early infarction is limited.

Several studies have demonstrated that a significant proportion of patients with acute coronary syndromes may have non-diagnostic initial ECGs. Reliance on a single ECG may therefore lead to misdiagnosis and inappropriate reassurance.

Serial ECG monitoring and repeated clinical assessment are essential, particularly in patients with ongoing symptoms. Additionally, the integration of cardiac biomarkers and clinical

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judgment remains crucial.

Misattribution of chest pain to benign causes such as GERD is a well-documented pitfall. Clinicians must maintain a high index of suspicion, especially when symptoms persist or evolve.

This case reinforces the importance of adhering to clinical guidelines that recommend repeated ECGs and observation in patients with suspected acute coronary syndromes.

6. Conclusion

Acute myocardial infarction may initially present with normal ECG findings, leading to potential misdiagnosis. Serial ECG and continuous clinical reassessment are vital in patients presenting with chest pain. Early recognition and timely intervention significantly improve patient outcomes.

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