Tension Pneumothorax Mimicking Acute Myocardial Infarction in a 58-Year-Old Male

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Introduction

Tension pneumothorax is a life-threatening condition that can present with chest pain, often leading to misdiagnosis. This report highlights a case where the diagnosis was obscured by clinical similarities to a myocardial infarction.

Case Presentation

A 58-year-old male with no prior history of chronic disease or medication presented to the emergency department with acute chest pain that began one hour prior. The pain was substernal, radiating to both arms, described as squeezing and sinking, without any aggravation during inspiration. Upon admission, the patient's vital signs were stable: blood pressure 116/83 mmHg, heart rate 76 bpm, and O2 saturation 94%. The physical examination yielded no significant findings. Both verbal and written consent have been obtained from the patient before writing this case report.

An electrocardiogram (ECG) was performed and showed no ischemic changes. However, by the 45th minute of monitoring, the patient reported exacerbated chest pain (8/10 on the pain scale), blood pressure dropped to 83/45 mmHg, and follow-up ECG revealed slight ST-segment depression with T-wave inversions in leads V2-V5 (Figure 1). Notably, troponin-T levels increased from 5 ng/mL to 41 ng/mL, prompting coronary angiography, which revealed no obstructive lesions (Figure 2A-C, Figure 3, Video 1). During fluoroscopy, an unusual hyperechoic mass was detected at the right border of the heart, which did not move synchronously with cardiac activity (Figure 3—red arrow, Video 1).

Following coronary angiography, a chest computed tomography (CT) scan was performed to rule out all acute emergency situations, revealing a complete collapse of the right lung and a 5 cm mediastinal shift to the left, indicating tension pneumothorax. The patient was promptly referred to the surgical team, and a chest tube was inserted. A follow-up CT on day five demonstrated a complete re-expansion of the right lung, and the patient was subsequently discharged (Figure 4A and B).

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Discussion

Tension pneumothorax is a critical emergency characterized by the accumulation of air in the pleural space, leading to increased intrathoracic pressure, respiratory distress, and potential cardiovascular compromise. Although it is commonly associated with trauma, spontaneous pneumothorax can also occur in individuals with underlying lung abnormalities.[1] This case highlights the importance of recognizing tension pneumothorax as a differential diagnosis in patients presenting with acute chest pain, as its clinical manifestations can closely mimic those of myocardial infarction.[2]

Clinical Presentation and Differential Diagnosis

The clinical presentation of acute chest pain can vary widely, and in this case, the patient's symptoms of substernal pain radiating to both arms raised suspicion for myocardial infarction. However, it is critical for clinicians to maintain a broad differential diagnosis that includes tension pneumothorax, particularly given that some patients may be asymptomatic or exhibit atypical presentations. Literature indicates that up to 10% of pneumothorax cases may present without significant symptoms, leading to a delayed diagnosis.[3]

The differential diagnosis of acute chest pain in this context is complicated by overlapping symptoms and signs. As pneumothorax may cause mediastinal shift, it can produce changes on the ECG that mimic myocardial ischemia, such as T-wave inversions.[4] In our case, the patient's T-wave inversions in leads V2-V6 contributed to the diagnostic challenge, emphasizing the need for thorough evaluation and consideration of alternative diagnoses.

Pathophysiology and Mechanisms of Pain

The mechanisms underlying chest pain in tension pneumothorax are multifactorial. Increased intrathoracic pressure can impair venous return to the heart, leading to decreased cardiac output and

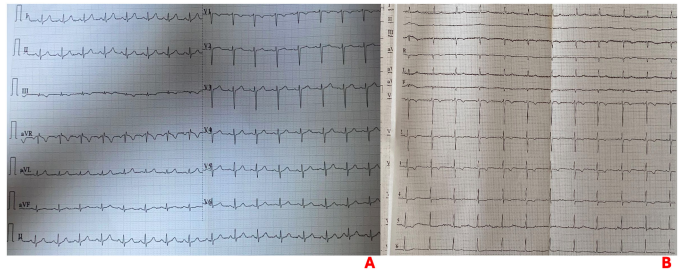

Figure 1. Basale (A) and follow-up (B) ECGs.

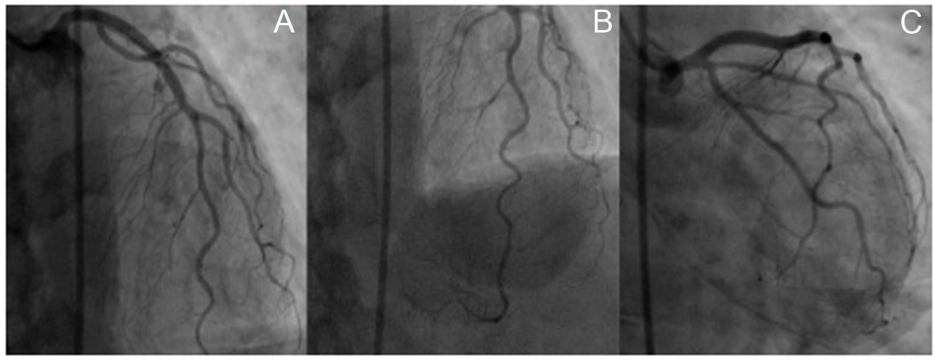

Figure 2. Coronary angiographic view of the left coronary system (2A: proximal and mid LAD, 2B: distal LAD, 2C: circumflex artery).

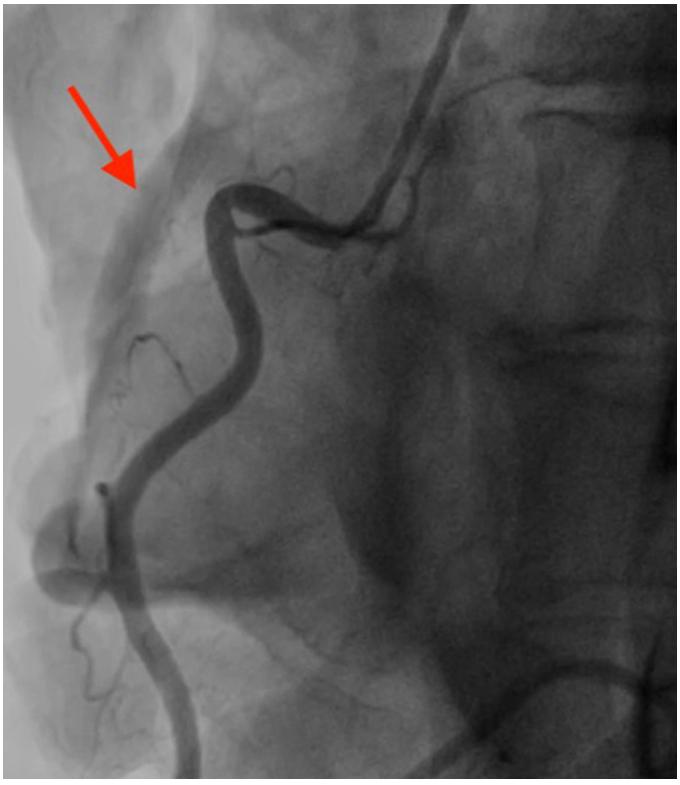

Figure 3. Coronary angiographic view of the right coronary system. *Red arrow indicates collapsed lung tissue, which seen as a hyperechoic view.

subsequent ischemic pain. Additionally, hypoxia due to reduced ventilation in the affected lung may exacerbate cardiac distress.[5] Elevated troponin levels observed in this patient may reflect myocardial injury secondary to ischemia rather than a primary cardiac event. Notably, it is essential to consider other conditions that can elevate troponin levels, but this patient had no history of renal failure, heart failure, or other comorbidities that could account for the elevation.

Furthermore, the vertical rotation of the heart during tension pneumothorax can result in specific ECG changes, particularly in lateral leads, complicating interpretation.[6] The identification of these changes necessitates careful correlation with clinical findings and imaging results.

Imaging and Diagnosis

Imaging plays a crucial role in the diagnosis of tension pneumothorax. In our case, the decision to perform a chest CT scan rather than a PA chest X-ray was based on the suspicion of a serious condition due to the patient's acute presentation. While a PA chest X-ray is often a first-line imaging modality, the CT scan provided comprehensive visualization that confirmed the diagnosis and assessed for potential complications.[7] The fluoroscopy performed prior to the CT scan revealed a mobile hyperechoic mass adjacent to the right border of the heart, indicative of collapsed lung tissue.

Following the identification of tension pneumothorax, immediate management with chest tube insertion was essential. The patient's follow-up CT demonstrated complete lung re-expansion, reinforcing the effectiveness of timely intervention in such critical cases.

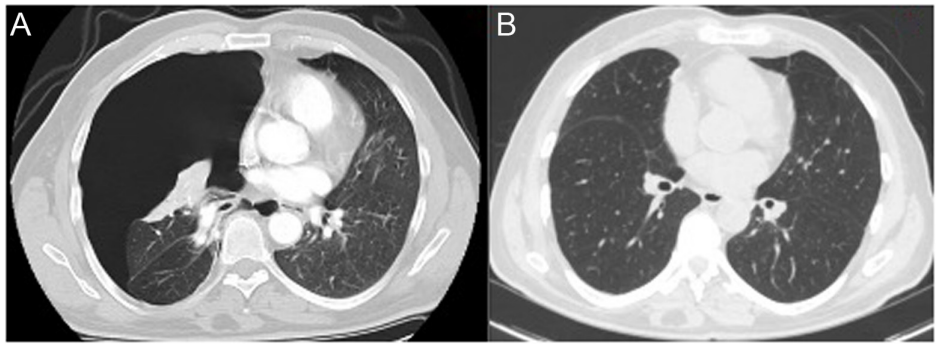

Figure 4. Thorax CT (A: pre-treatment, B: post-treatment).

Management and Outcomes

The management of tension pneumothorax is an urgent matter that requires rapid recognition and intervention. The chest tube insertion effectively alleviates the intrathoracic pressure, allowing for the re-expansion of the lung. This case underscores the importance of prompt diagnosis and treatment, particularly in cases where the clinical presentation may be misleading.[8] Clinicians should maintain a high index of suspicion for tension pneumothorax in patients with acute chest pain, especially when typical presentations of myocardial infarction are not entirely consistent.

Conclusion

In conclusion, this case illustrates the complexities involved in diagnosing acute chest pain and highlights the potential for life-threatening conditions like tension pneumothorax to present similarly to myocardial infarction. The findings emphasize the importance of a comprehensive evaluation, including imaging and careful interpretation of clinical signs and symptoms, to ensure accurate diagnosis and effective management. Future research should continue to refine the understanding of spontaneous pneumothorax presentations and improve diagnostic protocols in acute care settings.

Availability of Data and Materials: The data that support the findings of this study are available on request from the corresponding author.

Informed Consent: Both verbal and written consent have been obtained from the patient before writing this case report.

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Video 1: Coronary angiographic view of the right coronary system and collapsed lung tissue.

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