Two Cases of Pseudo Inferior Myocardial Infarction

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Abstract

We report two cases of pseudo inferior wall myocardial infarction where ST segment elevation in inferior leads was caused by hyperkalemia and atrial tachycardia respectively. Only one case of pseudo inferior MI caused by hyperkalemia has been reported so far and atrial tachycardia as a cause has hitherto been unreported.

Introduction

ST-segment elevation on ECG can occur secondary to causes other than myocardial infarction (pseudo myocardial infarction). These causes include acute pericarditis, hyperkalemia, diabetic ketoacidosis, acute pancreatitis, subarachnoid hemorrhage and myocardial contusion among others. Generally ST-segment elevation due to these causes is seen in all the leads with more pronounced changes in right anterior precordial (leads V1-V3) causing pseudo anterior infarction pattern. We report two cases of pseudo inferior myocardial infarction caused by hyperkalemia and atrial tachycardia respectively.

Case Reports

Case 1

A 78 y old female with diabetes and hypertension was admitted with chief complaints of severe nausea, one episode of vomiting, epigastric discomfort and mild shortness of breath of 8 hours duration. There was history of gastroenteritis 7 days ago that was treated with antibiotics for 5 days and oral rehydration therapy. She was on Ramipril 5 mg once a day for hypertension along with Metformin 500 mg once a day for diabetes. On examination heart rate was 70/bpm, BP was 160/90 mm Hg, respiratory rate was 22/min. Extremities were warm with good peripheral pulsations. Heart sounds were normal with no abnormal gurgles, rub or murmurs. ECG revealed presence of ST segment elevation in inferior leads, more pronounced in leads III and aVF (Figure 1). There were tall “T”-waves in anterior leads V₃₋V₅. Intravenous Tenecteplase was administered as primary treatment of acute inferior wall myocardial infarction. There was no significant change in symptoms 30 minutes following administration of thrombolytic therapy. Repeat ECG did not reveal any change from the baseline. Quantitative cardiac biomarkers (CK-MB and Troponin I) were normal. Other laboratory reports available 40 minutes later revealed presence of S. potassium of 7.8 mEq/L, BUN 58 mg/dl and S. creatinine 1.7 mg/dl. Immediate potassium lowering measures in the form of administration of intravenous calcium gluconate, sodium bicarbonate and potassium binding resins were started. Her symptoms improved after potassium correction and hydration. Interrogation of relatives revealed that she was advised to take oral potassium supplements after the bout of gastroenteritis and she was receiving it till the day of admission that resulted in severe hyperkalemia in the setting of dehydration and ACE inhibitors. ST segment changes resolved after correction of hyperkalemia. Her coronary angiogram performed one week later revealed normal coronary arteries.

Case 2

A 50 year old hypertensive male presented with chief complaints of chest discomfort and palpitations since 6 hours. His pulse was 145 bpm, BP 160/90 mm Hg and RR was 18/min. ECG (Figure 2) revealed marked sinus tachycardia and ST-segment elevation in inferior leads. Inferior wall myocardial infarction was suspected. However, close analysis of ECG revealed presence of ST segment deformation due to intervening P-waves which was making it appear like ST segment elevation. The correct diagnosis was atrial tachycardia with 2:1 conduction causing pseudo inferior MI pattern. He was treated with intravenous amiodarone bolus followed by infusion that resulted in restoration to sinus rhythm in 4 hours.

Discussion

Pseudo-infarction pattern on ECG can occur because of a variety of causes. The causes can be broadly divided in to two. (A) conditions producing abnormal Q waves suggesting the presence of an evolved myocardial infarction (B) Conditions producing ST segment elevation suggesting presence of an acute myocardial infarction. The latter is more alarming because of its immediate therapeutic implications. Moreover delay in identifying the true cause of ST segment elevation may have serious clinical consequences.

Hyperkalemia, along with other conditions like pericarditis, diabetic ketoacidosis⁴ and pancreatitis⁵ is one of the important causes of ST segment elevation resulting in incorrect diagnosis of myocardial infarction. The literature is replete with case reports where ST elevation due to hyperkalemia occurred in anterior chest leads.⁶ However there is only one case report⁷ citing hyperkalemia as the cause of pseudo-inferior MI. As seen in our case, presence of tall T-waves in anterior leads suggests a strong possibility of hyperkalemia. Atypical symptoms, absence of typical symptoms of myocardial infarction, good history and high index of suspicion should raise strong possibility of hyperkalemia as the cause of ST segment elevation. Important treatment decisions like thrombolysis or angioplasty may have to be taken in a setting of ST elevation MI even before the laboratory results are obtained. Obtaining an

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echocardiogram to detect regional wall motion abnormality is a very important tool that can help in making treatment decisions when pseudoinfarction is suspected. Getting an arterial blood gas is the quickest way to check the potassium levels. Unfortunately, our patient was thrombolysed before serum potassium results were obtained. Increased extracellular potassium produces ‘dialyzable current of injury’, however it is not clear how hyperkalemia can produce localized instead of diffuse ischemic ECG patterns.

Pseudo inferior MI pattern on ECG during atrial tachycardia has not been described before. Our second case highlights the importance of analyzing the rhythm first in any ECG particularly in presence of unexpected tachycardia or bradycardia. During atrial tachycardia with 2:1 conduction, P-waves between the two QRS complexes may fall on the ST segment of the preceding QRS producing apparent ST segment elevation. This is more likely to be evident in leads with positive QRS complex where the hump on the ST segment produced by the P-wave will produce apparent ST segment elevation.

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**References**