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Left Ventricular Aneurysm May Not Manifest as Persistent ST Elevation on Electrocardiogram

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Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Conflict of interest: None declared

Patient: Male, 67
Final Diagnosis: Left Ventricular aneurysm post myocardial infarction
Symptoms: Chest pain
Medication: Dual antiplatelet therapy • anticoagulation
Clinical Procedure: Cardiac catheterization
Specialty: Cardiology





Objective: Unusual clinical course
Background: Electrocardiographic presentations of left ventricle aneurysms are diverse; however, a persistent ST segment elevation post myocardial infarction is most commonly reported.

Case Report: The authors present a case of a 67-year-old man who presented to the emergency department after three days of chest pain and was found to have an acute myocardial infarction with an incidental finding of a left ventricular aneurysm. His surface electrocardiogram, however, demonstrated only inverted T waves in the precordial leads. He had a very elevated serum troponin I consistent with an acute myocardial injury which prompted a cardiac catheterization with angioplasty. Post angioplasty, he had persistent T wave inversions in the precordial leads.

Conclusions: It is important for clinicians to appreciate that the presence of newly inverted T waves in patients with a late presentation post myocardial infarction should raise a concern for a possible left ventricular aneurysm.

MeSH Keywords: Anterior Wall Myocardial Infarction • Electrocardiography • Heart Aneurysm

Full-text PDF: <http://www.amjcaserep.com/abstract/index/idArt/902884>

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Background

A left ventricular aneurysm (LVA) is a localized dyskinetic area of infarcted myocardium that bulges in systole and diastole [1]. It is a well-studied structural complication seen post myocardial infarction although decreasing in incidence due to major improvements in reperfusion therapy [2]. Persistent ST elevation is the most widely reported electrocardiographic manifestation of left ventricular aneurysms [3]. A fragmented QRS complex [4], a positive R wave in aVR [5], or a ST depression [6] has also been found in cardiac aneurysms. The main focus of this article was an unusual EKG pattern of persistent T wave inversions in a patient with a left ventricular aneurysm following an acute myocardial infarction. We also reviewed the literature on the sensitivity and specificity of EKG alterations in left ventricular aneurysm.

Case Report

A 67-year-old man presented to our facility for the first time with a chief complaint of atypical chest pain associated with fatigue for the past 3 days. He denied having any previous significant cardiac history and had not seen a physician for years. Vital signs on arrival to the emergency room showed a temperature of 36.8°C (98.3°F), pulse rate of 104 beats/minute, blood pressure of 169/116 mm Hg, respiratory rate: of 16 cycles/minute, and oxygen saturation of 100% on room air. On physical examination, he was alert, oriented, and in no apparent distress. Cardiac examination revealed the patient to be tachycardic with normal heart sounds but with displaced apex. Serial EKGs showed T wave inversion in V2-V6 (Figure 1). Initial serum troponin I was very elevated: 16 ng/mL (normal <0.05). CK-MB was 130 ng/mL (normal <5) with high CK-MB index of 13% (normal <5). The initial impression was non-ST elevated myocardial infarction. The patient received a loading

dose of aspirin and clopidogrel. He was started on heparin infusion. However, a routine chest radiography showed an incidental finding of an apical left ventricular bulge (Figure 2). A bedside transthoracic echocardiogram (Figure 3) done shortly before cardiac catheterization confirmed a left ventricular apical aneurysm and a significantly reduced ejection fraction of 10% with severe hypokinesis of the mid anterior wall, anterior septum and entire apex. Patient went into ventricular fibrillation and cardiac arrest with return of spontaneous circulation after three minutes of initiating the ACLS protocol.

An urgent cardiac catheterization showed a total occlusion in the proximal part of the mid left anterior descending artery (Figure 4) which was opened up and stented (Figure 5). The patient's ejection fraction improved to 45% five days post angioplasty. EKG findings of inverted T waves (Figure 1) remained unchanged during this admission and the patient was discharged home in a stable condition.

Discussion

The vast majority of left ventricular aneurysms result from a total occlusion of the left anterior descending artery which most commonly involves the anterior wall and cardiac apex [7] as noted in our patient. About 50% of left ventricular aneurysms are due to an acute myocardial infarction occurring within two days of the onset of chest pain with the remainder appearing within two weeks [8]. Complications of LVA include congestive heart failure, ventricular arrhythmias and rupture that can lead to sudden cardiac death [2].

Left ventricular aneurysms may be evident on chest x-ray [7,8], as observed in this case. Diagnosis is noninvasively confirmed using echocardiography [2,9]. EKG manifestations of LVAs vary widely [1]. Persistent ST elevation with or without Q wave in

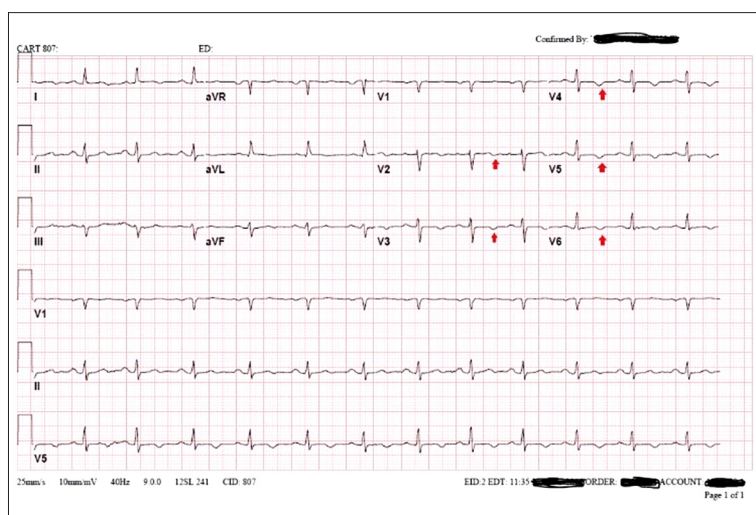


Figure 1. One of the serial EKG's showing T wave inversions in V2-V6.

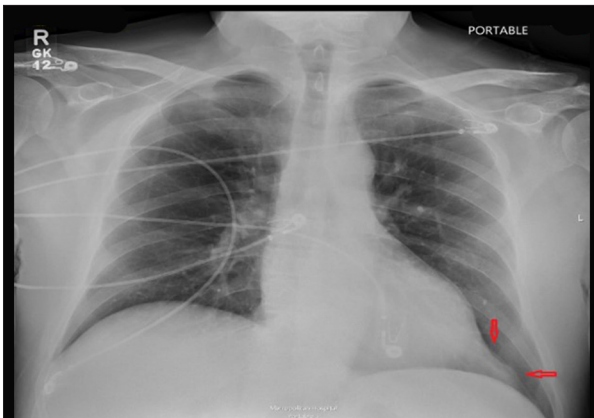


Figure 2. Chest x-ray. The arrows depict a left apical bulge.

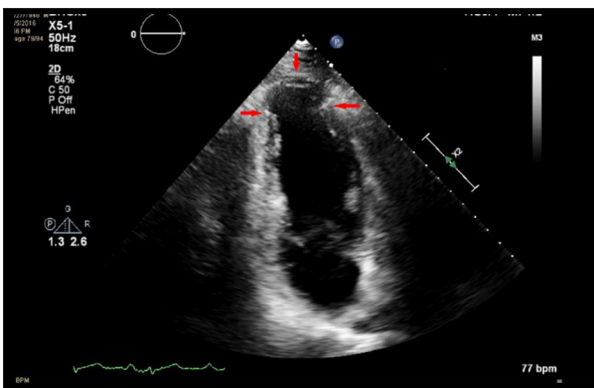


Figure 3. Apical 2-chamber view echocardiography, arrows show a thin-walled ventricular aneurysm in the cardiac apex.

the same precordial leads, suggests the presence of post-infarction LVA, and is the most commonly reported finding in the literature [3,10]. This was not the finding in our patient. The frequency of ST elevation varies from 84% [6] to 100% [11] in patients with anatomically defined LVA. Cohn et al. observed all patients with pre-existing LVA had varying degrees of ST elevations at autopsy and proposed EKG as a screening tool to detect left ventricular aneurysms [11]. While the sensitivity of persistent ST elevation in LVA exceeds 90%, specificity is low since left ventricular hypertrophy, left bundle branch block, left axis deviation, and normal variants may also present with some forms of ST elevation [11].

Non-ST elevation patterns are not frequently encountered in left ventricular aneurysms as noted in our extensive review of literature. Persistent ST depressions were reported in one study [6]. Fragmented QRS (fQRS) in the precordial leads has been described as a marker of a post-infarction cardiac aneurysm [4]. Reddy et al. encountered fQRS in 55 of 110 patients with confirmed LVA with a sensitivity of about 50% and a specificity of 95% [4]. A positive R wave in aVR (Goldberger's sign) frequently suggests a left ventricular aneurysm [5]. None of these findings were observed in our patient as a clue to an

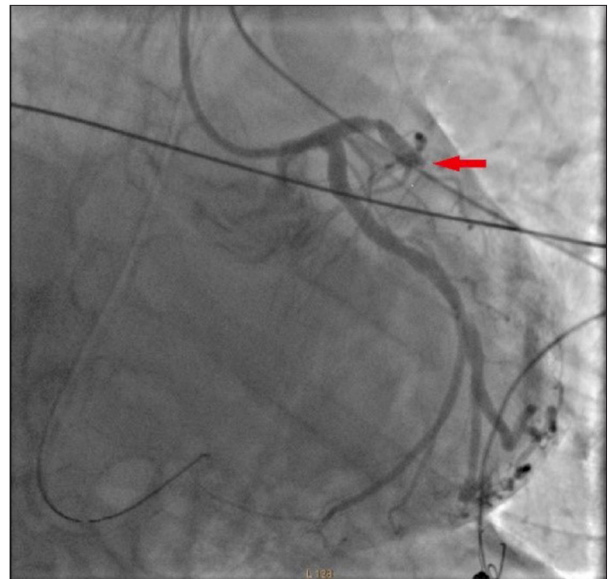


Figure 4. Cardiac angiography. The arrow shows complete occlusion of the mid LAD.

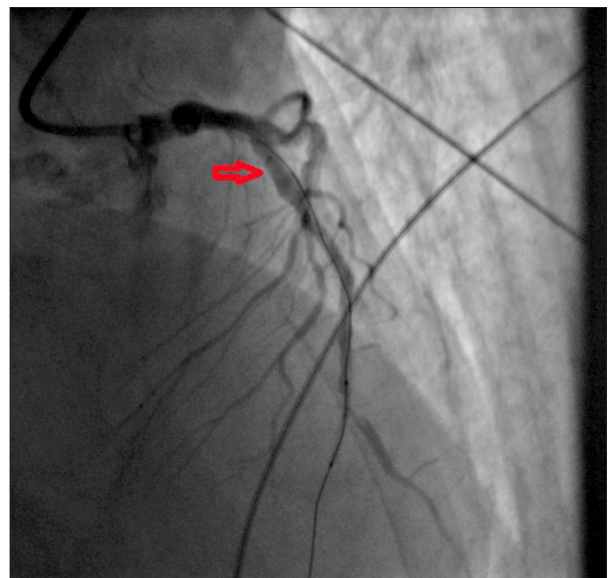


Figure 5. Post-angioplasty cardiac angiography. The arrow shows restored blood flow in the mid LAD.

underlying LVA. EKG pattern of an isolated persistent T wave inversion associated with LVA post-infarction is rare in the literature. In cases where T wave inversions were found in the precordial leads, they were almost always associated with ST elevations or Q waves [12].

Our patient presented late after having had three days of chest pain which was long enough to develop his left ventricular aneurysm [8]. His initial troponin I elevation was highly suggestive of myocardial necrosis [13]. His development of heart failure, ventricular fibrillation, and a cardiac arrest were

probably secondary to his left ventricular aneurysm [2]. Serial EKGs only showed T wave inversions in the precordial leads which were not suggestive of the presence of a prior LVA. To the best of our knowledge, we are unaware of any previous publications which reported isolated persistent T wave inversions in the setting of a left ventricular aneurysm. Although persistent T wave inversions usually follow a subendocardial infarction, Lancellotti et al. observed a similar finding post infarction, which represented irreversible transmural myocardial necrosis [14]. Since extensive myocardial necrosis precedes formation of a fibrotic cardiac aneurysm, this may explain the finding of persistent T wave inversions in a left ventricular aneurysm as seen in our patient.

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Conclusions

It is important to consider the possible presence of a left ventricular aneurysm in patients who present with chest pain and new persistent T wave inversions in the precordial leads post recent myocardial infarction.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.