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Left ventricular pseudoaneurysm: A rare but fatal condition

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Abstract

Left ventricular (LV) pseudoaneurysm (PA) is rarely seen and it is the result of free-wall myocardial rupture contained by overlying adherent pericardium, fibrous tissue without myocardial tissue. When it occurs, it is usually associated with myocardial infarction and is potentially prone to complications such as thromboembolic phenomenon and rupture with resultant cardiac tamponade. LV pseudoaneurysm is potentially fatal, and early detection with prompt treatment is important to prevent mortality. It is sometimes difficult to differentiate LV pseudoaneurysm from true aneurysm. It is, therefore, very important to use a combination of imaging modalities to evaluate the affected patients to confirm the diagnosis. We report the case of a fatal LV PA in a middle-aged man who had no history suggestive of prior myocardial infarction, diagnosed on two-dimensional Doppler echocardiography and contrast-enhanced computed tomography scan.

Keywords: Fatal, left ventricular pseudoaneurysm, rare

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INTRODUCTION

Left ventricular (LV) pseudoaneurysms (PAs) usually result from rupture of the ventricular free wall contained by the overlying adherent pericardium.^[1] The formed cavity is characterized by a narrow neck communicating freely with the left ventricle and has a tendency to expand and rupture.^[2,3] LV PA is rare and occurs usually as a complication of acute myocardial infarction. Other causes include trauma, postoperative endocarditis, and unexplained cases (idiopathic).^[4] The prevalence of LV PA is not known because of its rarity. We report a case of LV PA which was diagnosed in our center using echocardiography (echo) and contrast-enhanced computed tomography (CT) scan.

CASE REPORT

The patient is a 50-year-old unemployed man who presented with recurrent left-sided chest pain of about 5 weeks' duration. The chest pain was continuous, nonradiating, lasting up to hours at times without any symptom suggesting hemodynamic compromise, and was unrelated to physical activity. He had been treated severally by primary care physicians for gastroesophageal reflux disease. He had a history of significant alcohol consumption and about 10 pack-years of tobacco smoking. He was neither hypertensive nor diabetic. He denied any history of premature cardiovascular disease or sudden unexpected death in his family.

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Significant physical findings on examination were pulse rate of 96 beats/min, regular but of moderate volume. Blood pressure was 130/85 mmHg. His body mass index was 24.8 kg/m² and waist circumference was 85 cm. He had a displaced apical impulse located at the 6th left intercostal space anterior to the axillary line with a heave and an apical pan-systolic murmur. He had an electrocardiogram (ECG) done which showed T-wave inversions in leads I, aVL, V4-V6, and a few atrial ectopic beats [Figure 1]. Troponin I was within normal limits. His two-dimensional (2D) echo study revealed a mild pericardial effusion of about 0.5 cm, an enlarged left atrium (5.6 cm), and a large fluid-filled sac adjacent to the LV mid cavity measuring about 8.8 cm × 6 cm with a small connection to the main LV chamber measuring about 7.89 mm in diameter [Figure 2]. Color Doppler activity (mosaic) was clearly observed in the sac and in the connection between both cavities, suggesting flow of blood between them [Figure 3]. No thrombus was observed in the PA. There was also apical and LV free-wall hypokinesia. A contrast-enhanced chest CT scan done confirmed the presence of a PA of the left ventricle as the PA was seen to fill up with contrast when filling occurred in the main LV cavity [Figures 4-6]. He was placed on oral atenolol 25 mg daily, oral aspirin 150 mg daily, oral rosuvastatin 10 mg daily, and low-dose oral torsemide 20 mg daily.

He was counseled for surgery and was to have the procedure done outside Nigeria. However, a few days after his last interaction with the managing team, he developed sudden chest pain at night during sleep and died before he could reach the hospital.

DISCUSSION

PAs of the left ventricle are rare and when they occur, are usually a complication of myocardial infarction.^[2] True aneurysms involve the full thickness of myocardial wall while PAs are a result of rupture of the ventricular free wall contained by the overlying adherent pericardium.^[1] They have a higher risk of rupture than true aneurysms which has been estimated to be between 30% and 45%.^[3-5]

Our patient presented with left-sided chest pain which was, however, not typical of angina or myocardial ischemia. However, while ECG and troponin I assay were done, coronary angiography was not done to conclusively exclude the presence of coronary artery disease in this patient in view of the presence of risk factors that are highly associated with the disease such as cigarette smoking and abuse of ethanol. This was still being planned before the patient died. The clinical presentation of LV PAs varies. While they could present with angina, heart failure symptoms or ventricular arrhythmias, thromboembolism or other symptoms of cardiac disease, they could also

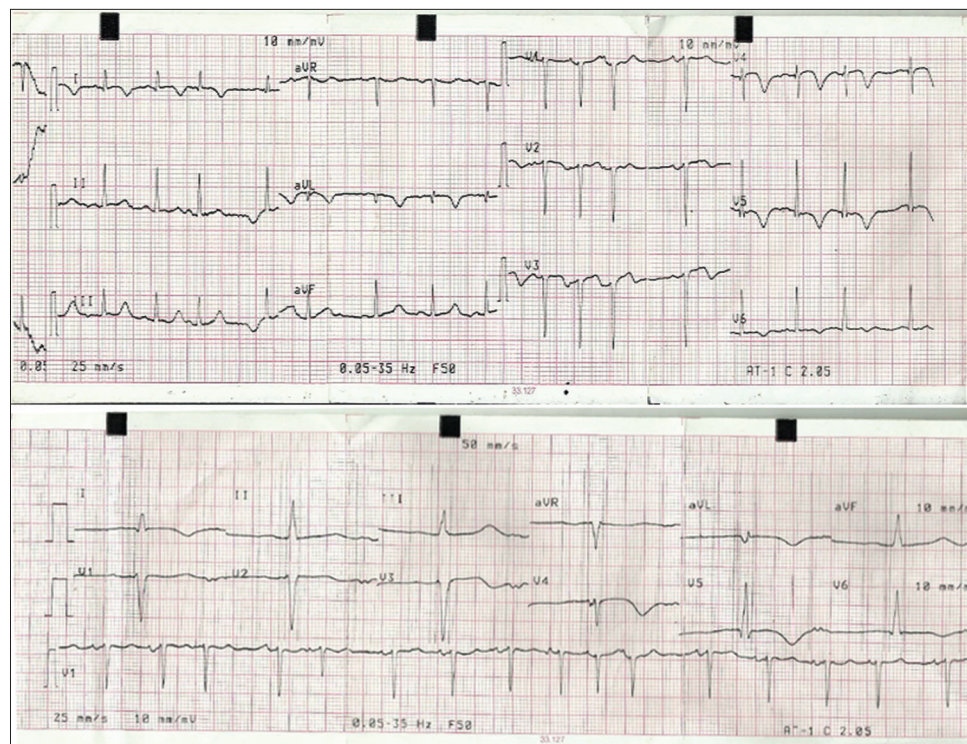


Figure 1: Electrocardiogram of the patient showing T-wave inversion in leads I, aVL, V4-V6, and atrial ectopic beats

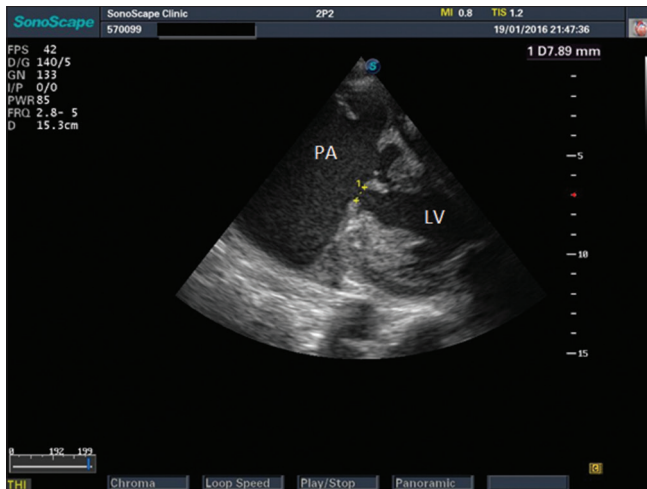


Figure 2: Two-dimensional echocardiography image showing an apical pseudoaneurysm adjoining the left ventricular cavity with a neck measuring 7.89 mm

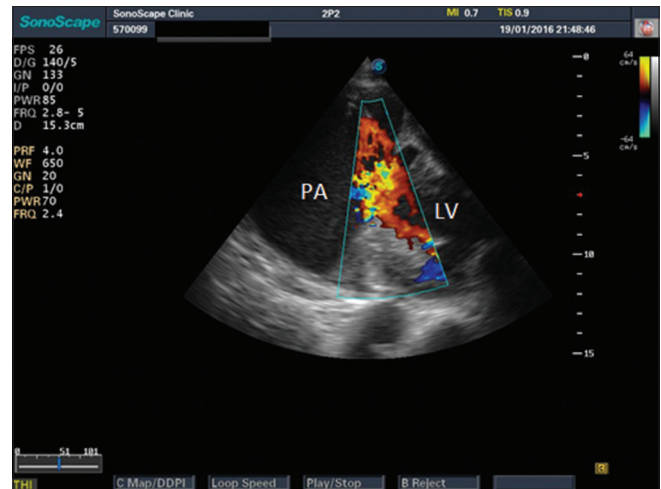


Figure 3: Color Doppler image demonstrating flow across the apical pseudoaneurysm adjoining the left ventricular cavity

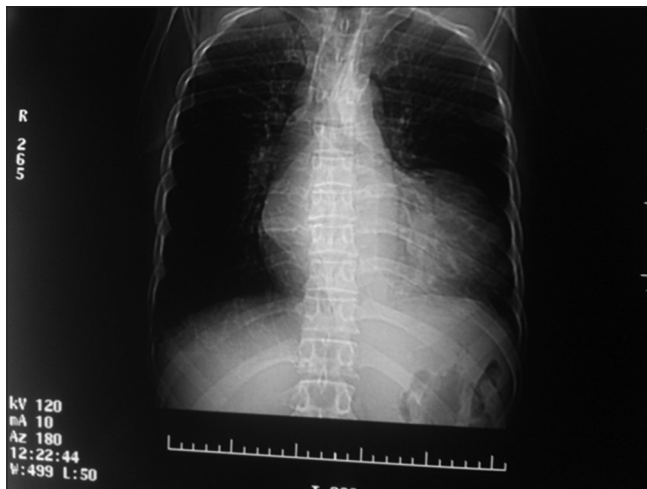


Figure 4: Scanogram of the chest computed tomography scan done showing cardiomegaly and a bulging left ventricular apex

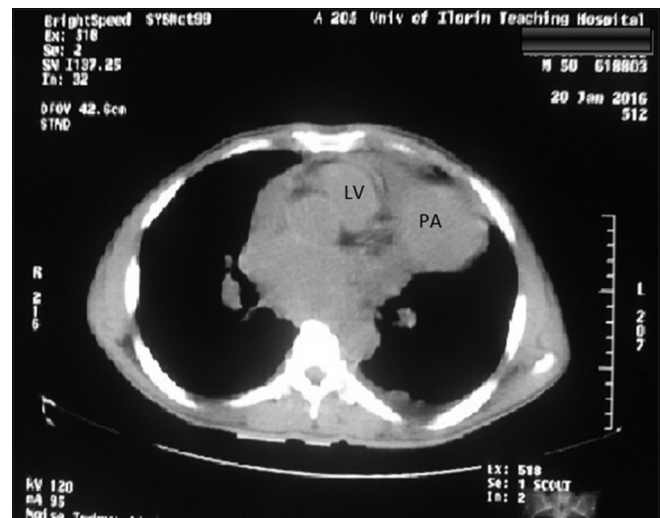


Figure 5: Precontrast film of the chest computed tomography showing the left ventricular cavity and the pseudoaneurysm

be asymptomatic or present with nonspecific symptoms which may even be attributed to other causes. Symptoms such as cough, dizziness, and altered mental status were reported among the 290 cases reviewed by Frances *et al.*^[6] Yeo *et al.* in a series of about 52 patients with LV PAs reported that 48% of them were asymptomatic;^[7] however, among Frances *et al.*'s cohort, 10% were asymptomatic.^[6]

Investigating a pseudoaneurysm frequently requires a multi-modal approach, though in obvious cases, a single investigative modality such as 2D echo may confirm the diagnosis. The 2D echo with color Doppler is readily available and was reported to provide a definitive diagnosis among 25%–33% of the cases reported in a series of 290 cases analyzed by Frances *et al.*^[6] di Summa *et al.* in Kenya also reported the diagnosis of a large LV

PA of similar dimensions to ours based on 2D echo demonstration of the aneurysmal sac, narrow neck, and blood flow into and out of both cavities.^[8] The patient's findings at operation were similar to echo findings. Other useful imaging modalities would include chest X-ray, trans-esophageal echo, CT scan, magnetic resonance imaging (MRI), and angiography. However, basic investigative modalities of the cardiovascular system such as the ECG usually show one abnormality or the other, but usually nonspecific for a pseudoaneurysm. In our patient, a definitive diagnosis was made on 2D echo with further confirmation by contrast-enhanced CT scan of the chest. Often times, more than one imaging modality will need to be employed to confirm a diagnosis and no single imaging modality has been found to be 100% accurate in diagnosis. Even modalities such as MRI, though detecting

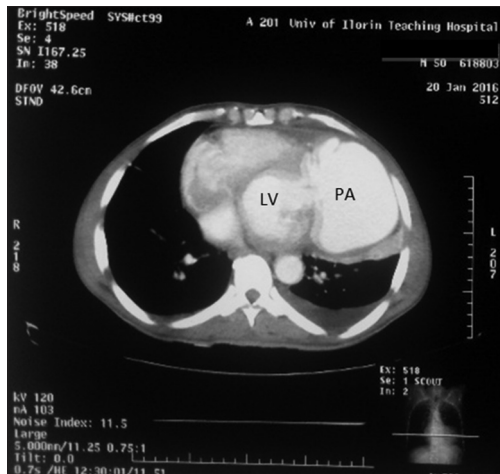


Figure 6: Postcontrast film of the chest computed tomography scan showing the filling of the pseudoaneurysm from the left ventricular cavity

an abnormality among the 17 cases of Frances' cohort who had it done, provided a definitive diagnosis only in 9 (53%) cases. Angiography is, however, considered the best single modality for making a diagnosis.^[9] Not only does it define the state of the coronary arteries, but also it defines the LV cavity as well as the neck and cavity of a PA and also distinguishes it from a true aneurysm by demonstrating the absence of coronary arteries around it. It thus would have helped in planning for a definitive surgical management. However, widespread availability still limits its applicability to all cases and thus more widely available investigative modalities will remain very important for now. Our patient's aneurysm was located around the LV apex and was not related to the mitral valve annulus. Aneurysms described among Nigerians by Abrahams *et al.*^[10] and Warren *et al.*^[11] were annular submitral aneurysm described as lying above the left atrium. Ours was neither in such position nor related to the mitral valve annulus.

A pseudoaneurysm usually has a narrow neck, with a ratio of the neck to the widest diameter of <50%.^[12,13] On echo, our patient had a ratio of about 0.24. This compares with an echo series, in which the ratio of the maximum diameter of the orifice to the maximum internal diameter of the cavity was between 0.25 and 0.50 for PAs and 0.90 and 1.0.^[14]

The etiology of LV PA is myriad. Although most commonly occurring following myocardial infarction,^[7] it could also occur postcardiac surgery, posttrauma, and can complicate infectious and inflammatory processes of the heart such as abscesses, endocarditis, and myocarditis. Our patient's chest pain was not a typical pain of myocardial ischemia, so other etiologies such

as myocarditis are possible. Unfortunately, he was still awaiting evaluation for this before his sudden demise.

Surgical treatment has been the most preferred treatment by most clinicians over time.^[15-17] However, patients with LV PA have a high mortality rate irrespective of treatment. Immediate postoperative mortality could be as high as 23%,^[6] though the risk of rupture could double this in individuals who are managed conservatively.^[3-5] Death could occur from various etiologies such as rupture complicated by cardiac tamponade, thromboembolic phenomenon,^[1,18] and arrhythmias being commonly implicated.^[6] Our patient most likely succumbed to a spontaneous rupture and unfortunately the proposed postmortem was not assented to by his relatives.

CONCLUSION

The LV PA is an uncommon lesion but with potentially fatal consequences. Prompt diagnosis and surgical intervention remain the bedrock for avoiding mortality in affected patients.

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Conflicts of interest

There are no conflicts of interest.

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