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Paradoxical Coronary Embolus-A Rare Cause of ST-Elevation Myocardial Infarction

Hussayn Alrayes
Henry Ford Health System

Sachin Parikh
Henry Ford Health System

Paradoxical Coronary Embolism – A Rare Cause of ST-Elevation Myocardial Infarction

Hussayn Alrayes, DO[1], Sachin Parikh, MD[2]
[1]Department of Internal Medicine, Henry Ford Hospital, Detroit, MI
[2]Department of Cardiology, Henry Ford Hospital, Detroit, MI

Introduction

Paradoxical emboli are well-described causes of peripheral arterial occlusions and stroke but can be involved in coronary vasculature in up to 10% of cases [1]. Given the rarity and potentially devastating effects, high suspicion for this entity is paramount in individuals with low risk for atherosclerotic disease who present with coronary occlusion. Our case demonstrates a patient who was initially diagnosed with bilateral pulmonary embolisms (PE), but upon further investigation was found to have paradoxical coronary emboli causing an ST segment elevation myocardial infarction.

Case Presentation

A 45-year-old male with recent mandibulo-maxillary fixation secondary to jaw trauma was admitted to our facility with complaints of substernal burning with radiation to his left scapula. This was associated with shortness of breath, palpitations, and lightheadedness. He denied any personal or family history of deep vein thrombosis (DVT) or PE and had been bed-bound for two days for his jaw surgery five weeks prior. Initial electrocardiogram showed no ST segment changes or T-wave inversions, but troponin levels were elevated to 1,600 ng/L. CT chest with IV contrast demonstrated emboli in the right middle, right lower, and left upper lobar arteries, with involvement of the segmental and subsegmental arteries. Bilateral lower extremity dopplers revealed total occluding acute thrombi involving the right and left gastrocnemius and posterior tibial veins. He was placed on IV heparin and shortly afterwards experienced worsening chest pain. Repeat electrocardiogram showed 2mm ST segment elevations in V2-V5, and troponin levels rose to 37,570 ng/L. Coronary angiogram demonstrated 100% stenosis of the distal left anterior descending artery consistent with embolic occlusion. Transthoracic echocardiography with agitated saline showed hypokinesis of the left ventricular apex and a patent foramen ovale (PFO) with right-to-left shunting. He underwent PFO closure shortly afterwards with a 25mm Cardioform Occluder device and was discharged home with warfarin after 24 hours of observation. On follow-up, patient had done well and had not experienced any other further thromboembolic sequelae.

Radiographic and Clinical Images

Figure 1. EKG Demonstrating ST-Elevations In V2-V5

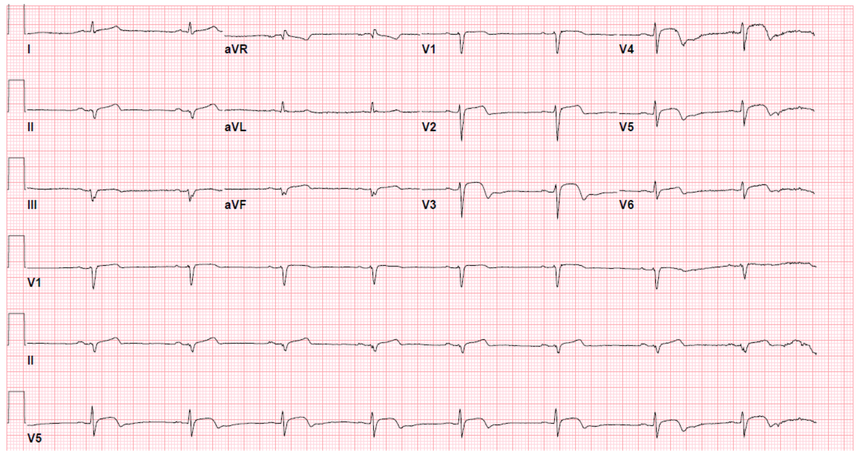
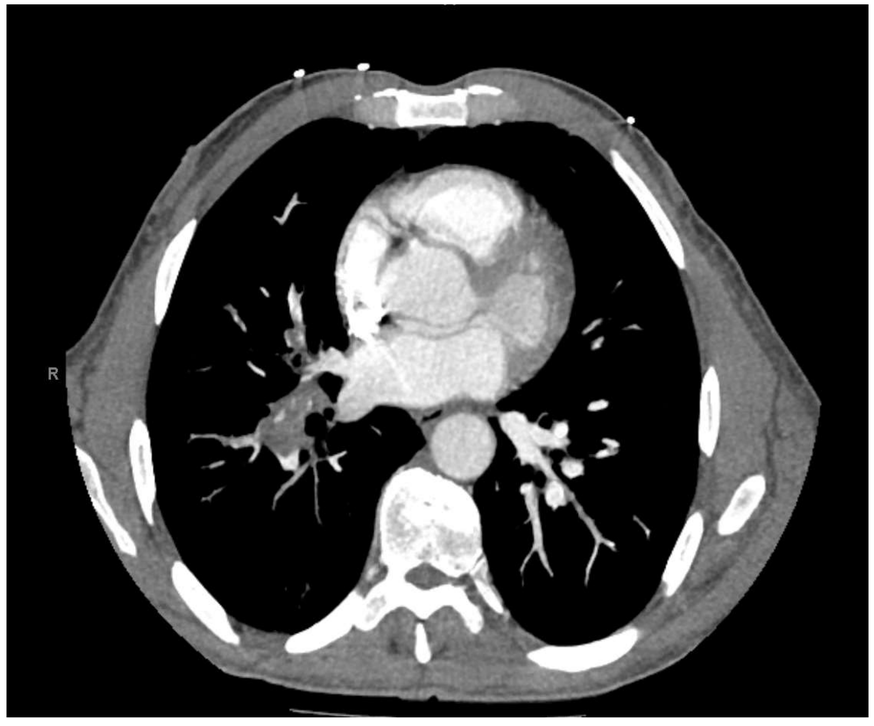


Figure 2. CT Chest with Contrast Demonstrating Right Lobar Pulmonary Artery Emboli



Discussion

Our patient suffered bilateral lower extremity DVTs, which likely led to his extensive bilateral PEs and coronary arterial embolus via a PFO. Four elements must be present in order to presumptively diagnose a paradoxical embolus. These diagnostic criteria include confirmation of systemic embolism by angiographic or pathologic findings without an apparent source in the left heart or proximal tree, establishment of an embolic source within the venous system, identification of an abnormal intrapulmonary or intracardiac communication between the left and right chambers, and detection of a pressure gradient to drive right-to-left shunting. Only with direct visualization of a thrombus within an intracardiac septal defect can paradoxical embolism be proven [2]. Potential treatments include thrombolysis, coronary angioplasty, and catheter aspiration embolectomy [3-6]. Although there have been no studies evaluating PFO closure for coronary arterial emboli, there have been several landmark studies assessing the efficacy of PFO closure in cryptogenic stroke, including the Gore REDUCE trial, CLOSE trial, and RESPECT trial, which have shown that PFO closure reduces the risk of recurrent strokes when compared to anti-platelet therapy. The direct benefit of PFO closure versus anti-coagulation is still unclear [7-9]. Despite the growing data regarding the use of PFO closure devices in cryptogenic stroke, the utility of such closure devices in paradoxical coronary emboli remains unclear, especially with documented DVT and the concomitant independent need for anticoagulation. Further studies may be needed to clarify the efficacy and benefit of such closure devices in this patient population.

References

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