Cardiac tamponade on ECG-gated dipyridamole PET perfusion imaging

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Case Report. A 47-year-old female was admitted to our hospital with an acute ST segment elevation myocardial infarction. The patient underwent a percutaneous coronary intervention with a bare metal stent placed in the left anterior descending coronary artery (LAD). She was optimized on medical management and was discharged. One week later, she presented to the emergency department post-ventricular fibrillation cardiac arrest with return of spontaneous circulation. An electrocardiogram revealed acute anterior ST segment elevation. Urgent cardiac catheterization demonstrated stent thrombosis in the LAD with severe left ventricular systolic dysfunction on dual anti-platelet therapy. Despite a prolonged attempt, the thrombosed LAD could not be percutaneously recanalized and the patient continued to experience chest pain. On exam, she was tachycardic at 105 and blood pressure was 102/68. Dipyridamole Rubidium-82 (Rb-82) Positron Emission Tomography myocardial perfusion imaging (PET MPI) was performed to assess ischemic burden for consideration of further revascularization. Rubidium-82 was injected and a 5-minute PET imaging acquisition was performed at rest and stress. Computerized reconstruction of the images was performed for analysis. Rb 82 PET MPI demonstrated large fixed anterior defect with akinesis of the anterior and septal segments. Further, it demonstrated a moderate-sized hypodense area visualized around the entire heart (Figures 1, 2). Gated PET MPI demonstrated the presence of right ventricular diastolic collapse suggestive of cardiac tamponade (Video 1 in Supplementary material). Computed tomography image obtained for attenuation correction also demonstrated the large pericardial effusion (Figure 3). An echocardiogram performed the same day confirmed the findings of cardiac tamponade with early diastolic collapse of right ventricle. Subsequently, the patient had a pericardial window placed with 500 cc of serosanguinous fluid drained. Cytology of pericardial fluid and pathology of pericardial tissue was consistent with post-myocardial infarction pericarditis. The patient was discharged 4 four days later with medical therapy.

Discussion. This case describes the identification of cardiac tamponade by cardiac PET MPI. Generally, M-mode and two-dimensional Doppler echocardiography are the test of choice for diagnosis and assessment of pericardial effusion and tamponade physiology because of its convenience and ease of application.[1] Computed tomography and magnetic resonance imaging are useful adjuncts to echocardiography in the characterization of effusion. The diagnosis of pericardial effusion using radionuclide methods is uncommon, although there are a few reports.[2-4] Findings suggestive of the diagnosis include photopenia surrounding the heart on rotating images due to fluid accumulation, as well as increased translational motion of the heart on the gated images.[2] In this patient, the CT image obtained for attenuation correction was supplementary to the perfusion data. Diagnosis of cardiac tamponade using cardiac PET imaging has not been previously described. In our case, PET MPI demonstrated photopenia around the heart suggesting fluid accumulation and the presence of diastolic collapse of the right ventricle on gated imaging indicating tamponade physiology. The ability of cardiac PET to identify right ventricular collapse is due to the higher spatial resolution of 511-kev imaging. An important clue in making the diagnosis of cardiac tamponade was the initial identification of the pericardial effusion leading to careful examination of the right ventricle. This case also emphasizes the importance of PET imaging in identifying the cardiac tamponade. This was the first study to make the diagnosis and played a key role in the management.

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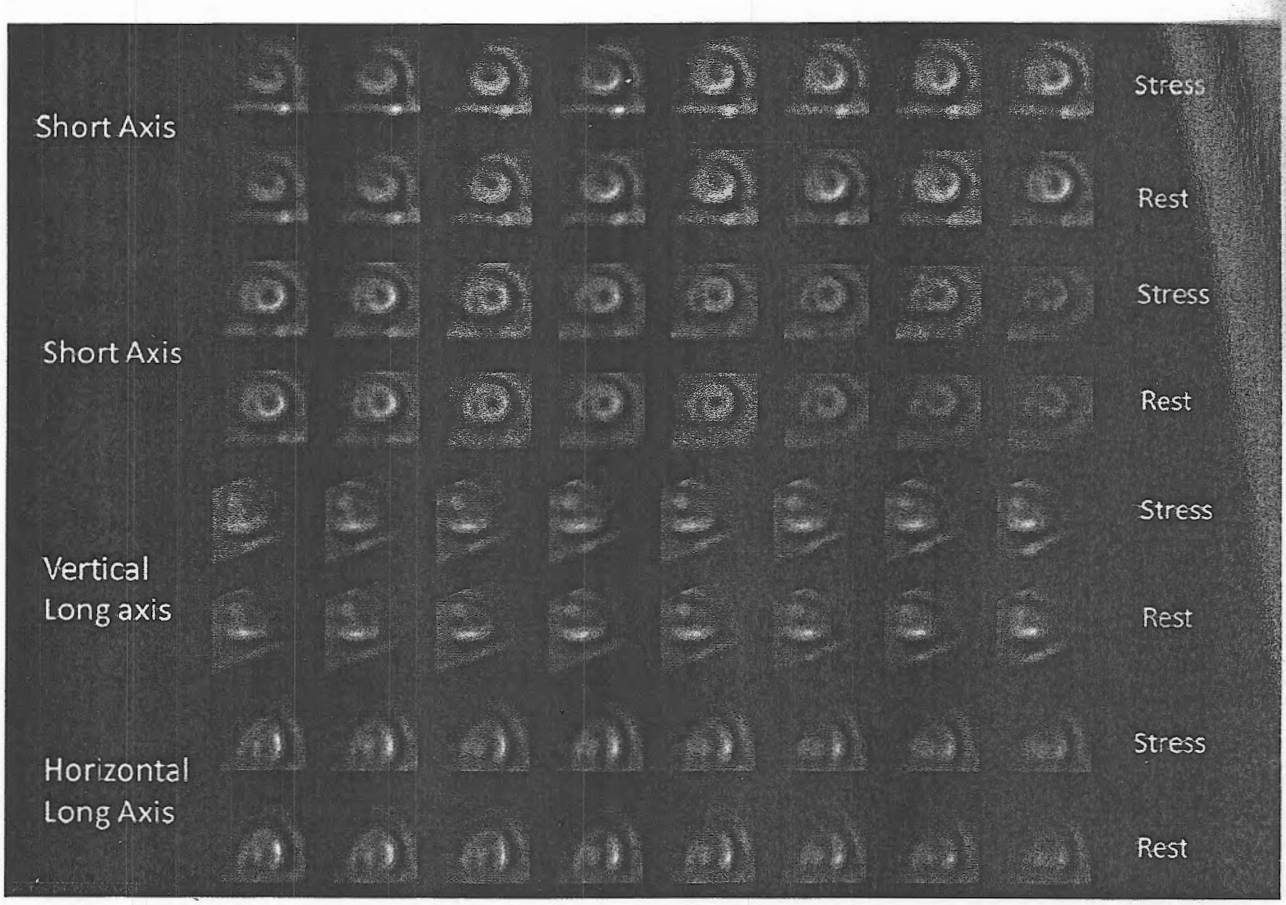

Figure 1. PET images demonstrating a moderate-sized hypodense area visualized around the entire heart. Also seen is large fixed anterior defect with akinesis of the anterior and septal segments. *PET*, Positron emission tomography.

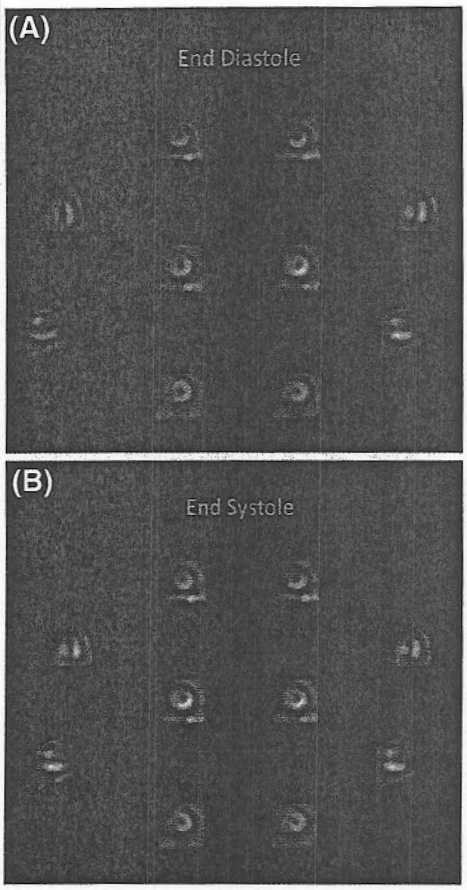

Figure 2. A End Diastolic PET image, B end systolic PET image. *PET*, Positron emission tomography.

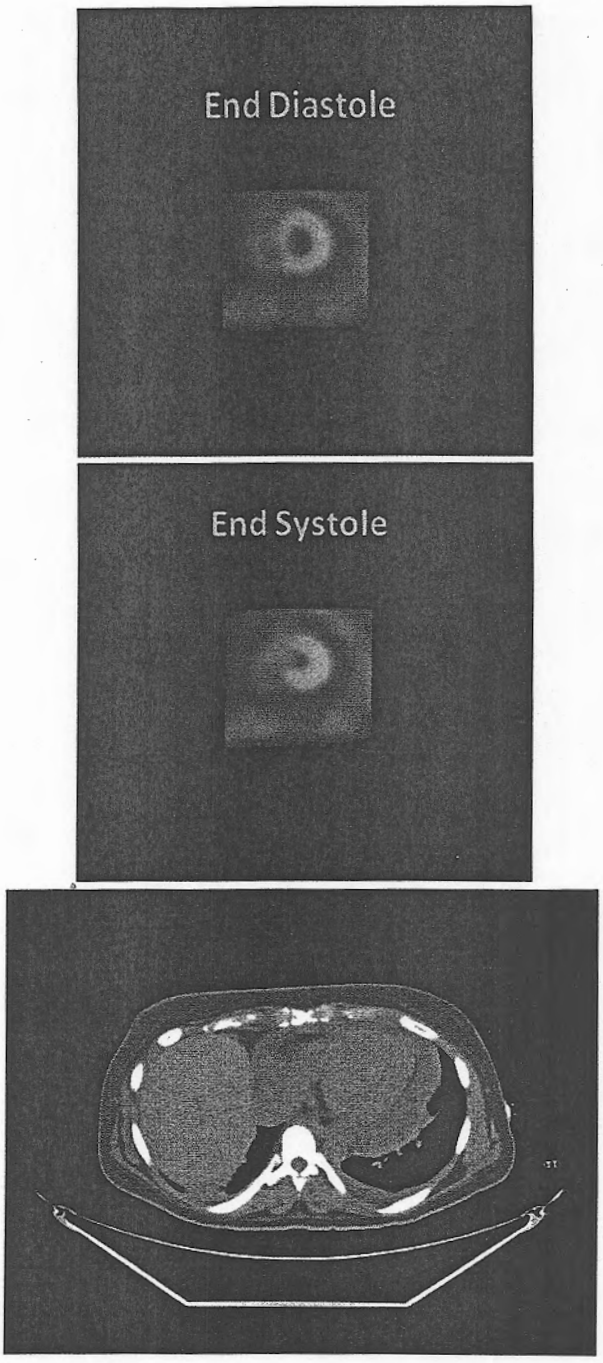

Figure 3. Pericardial effusion seen on CT image obtained for attenuation correction. *CT*, Computed tomography.

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