Incidental Detection of Massive Left Ventricular Calcification by Myocardial Perfusion Imaging: A Case of Imaging Illustrations

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INTRODUCTION

Cardiac calcification is not uncommon, but massive left ventricular (LV) myocardial calcification is rare and can be an uncommon cause of congestive heart failure.1,2 Myocardial calcification can be associated with metastatic deposition, infarction, or other endocrine disorders.3 It represents abnormal accumulation of calcium salts in the myocardium and includes two basic forms: dystrophic and metastatic.4 Dystrophic calcification is more prevalent than metastatic calcification. Dystrophic calcium deposition is commonly observed in areas of myocardial infarction or primary myocardial disease.5 Metastatic calcification is caused by deposition of calcium salts in previously normal tissue due to disturbance in calcium or phosphorus metabolism seen in disorders like hyperparathyroidism, chronic renal disease, widespread bone destruction from metastases, or myeloma.3 Depending on the degree of calcification, it can be detected by chest x-ray, echocardiography, or computed tomography (CT) of the chest. Chest CT is the optimal modality for identifying and characterizing myocardial calcifications as illustrated in this case. Myocardial calcification is an important marker of underlying pathology and knowledge of its potential etiology is important to provide accurate differential diagnosis.

We report a case with illustrated images of massive LV calcification detected incidentally during regadenoson single photon emission computed tomography (SPECT) myocardial perfusion imaging (MPI) and confirmed by chest computed tomography.

CASE REPORT

This case was a 70-year-old patient who had a history of atrial fibrillation (AF), symptomatic of dyspnea and congestive heart failure. At that time, his AF was converted by electrical cardioversion with resolution of his symptoms. A year later, he presented with several months’ history of progressive and marked dyspnea with minimal exertion. He underwent regadenoson MPI for cardiac evaluation. His electrocardiogram (ECG) showed a normal sinus rhythm, first degree atrioventricular (AV) block, and T wave inversion in the inferolateral leads suggestive of myocardial ischemia (Figure 1). His MPI demonstrated mildly decreased LV ejection fraction of 49% without evidence of myocardial ischemia or infarction; however, significant LV calcification (Figure 2) was observed on the low-dose CT used for attenuation correction during MPI.

Subsequently, other imaging studies, including chest x-ray, echocardiography, and chest CT, were obtained for further evaluation. The chest x-ray (Figure 3) showed extensive cardiac calcification, and the echocardiogram (Figure 4) revealed significant calcification of mitral valve annulus, LV septum, and mid free wall. However, his chest CT (Figure 5) revealed massive myocardial calcification involving only LV and its overlaying pericardium.

Figure 1. The electrocardiogram showed normal sinus rhythm, first-degree AV block, and T-wave inversion in the inferolateral leads.

Figure 2. The axial image of low-dose CT during MPI demonstrated a significant amount of calcification at mitral valvular annulus, LV myocardium at septum, and free wall as well as pericardium (white arrows). [LA = left atrium; LV = left ventricle; RA = right atrium; LV = left ventricle.]

Figure 3. The posteroanterior (left) and lateral (right) views of patient’s chest x-ray.

Figure 4. The echocardiogram showed significant calcification of mitral valve annulus, LV septum, and mid free wall.

Figure 5. The chest CT revealed massive myocardial calcification involving only LV and its overlaying pericardium.
The patient had no past history of malignancy, endocrine disorder, tuberculosis, or recent traveling to other countries.Extensive laboratory evaluation revealed elevated NT-proB-type Natriuretic Peptide (113.5 pg/ml; normal < 100 pg/ml) and C-reactive protein (1.21 mg/dL, normal < 0.5 mg/dL), but normal findings of complete blood count, basic chemistry profile, troponin-I, sedimentation rate, antinuclear antibody, antimitochondrial antibody, serum calcium/phosphate level, vitamin D level, and thyroid and parathyroid hormone levels. His echocardiography showed: (1) normal LV systolic function with calcification in the LV septum, mid free wall and mitral valve annulus (* in upper left image), and pericardium (white arrows in upper and lower left images) over the LV, [LA = left atrium; LV = left ventricle; RA = right atrium; LV = left ventricle.]

The final diagnosis was congestive diastolic heart failure due to massive LV myocardial calcification of unknown etiology. He was treated with aggressive diuresis and other guideline-driven medical therapy successfully with marked improvement of his dyspnea on exertion during follow-up.

DISCUSSION

The SPECT MPI is a well-established, commonly used diagnostic test for evaluation of coronary artery disease (CAD). To improve quality of the study, low-resolution CT is used commonly for artifact attenuation and anatomical correction during SPECT MPI. The low-resolution, unenhanced CT portion of the MPI is considered low-quality, therefore, labelled by manufacturer as “non-diagnostic”.

There is no uniform or consensus recommendations of reporting incidental findings during cardiac CT imaging. They ranged from no recommendations, to optional, to recommended or mandatory reporting.13,16 This report described, for the first time, the incidental detection of a massive LV myocardial calcification by low-resolution CT during cardiac MPI in a patient presented as congestive heart failure. Therefore, it was appropriate and necessary to review low-resolution CT images during cardiac MPI to detect incidental but clinically significant findings.

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