Stress-induced ischemia in the right ventricular myocardium on ^{99m}Tc-MIBI myocardial perfusion scintigraphy in a rare case of double-chambered right ventricle

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INTRODUCTION

Right ventricle (RV) myocardial perfusion assessment is not attempted in stress/rest SPECT myocardial perfusion imaging (MPI) owing to poor visualization of the RV myocardium (unless hypertrophied) likely due to lower myocardial blood flow, less myocardial thickness, and limited spatial resolution of present-day gamma cameras.[1] RV wall ischemia can occur along with left ventricular (LV) inferior wall ischemia since both are supplied by the right coronary artery (RCA) and hold significant prognostic value.[2] The authors present a rare case of a 65-year-woman with reversible perfusion defects in inferior wall of left ventricle as well as right ventricle (RV) leading to the incidental detection of double-chambered RV (DCRV) with anomalous muscle band (AMB) in coronary angiography (CAG) as the possible etiology leading to the RV myocardial hypertrophy enabling it to be detected on MPI.

CASE SUMMARY

A 65-year-old woman with long-standing hypertension and diabetes on medical treatment since the past ten years presented with NYHA III dyspnoea and atypical chest pain associated with palpitation since 6 months. She had a regular peripheral pulse rate (74 beats/minute) and well-controlled blood pressure. Cardiac examination revealed grade 4/6 pansystolic murmur in the left parasternal area. 2D echocardiogram showed regional wall motion abnormalities in RCA and left circumflex artery territories along with mild mitral regurgitation and moderate pulmonary artery hypertension. Her rest electrocardiogram (Figure 1A) showed mild ST-segment depression with T-wave inversion in inferior leads and mild ST-segment depression in lateral leads which got accentuated during peak stress (Figure 1B) with significant ST-segment depression (down-sloping) in leads II, III, aVF, and V3-V6 with slow recovery (> 3 minutes) in one-day adenosine stress/rest ^{99m}Tc-sestamibi gated SPECT/CT MPI. MPI images showed reversible perfusion defect in LV inferior wall and inferior and free wall of the RV (Figure 2). CAG showed significant (95%) tubular luminal stenosis in proximal RCA and DCRV with AMB in catheterization study (Figure3). The estimated pulmonary artery pressure from catheterization study was 35/15/20 mm Hg (systolic/end-diastolic/mean, respectively).

DISCUSSION

The index case showed incidentally detected DCRV with AMB on CAG following stress-induced ischemia in LV inferior wall and RV on MPI. DCRV is a rare congenital anomaly often diagnosed in childhood.[3] The resulting RV myocardial hypertrophy explained the myocardial thickness probably sufficient enough to be

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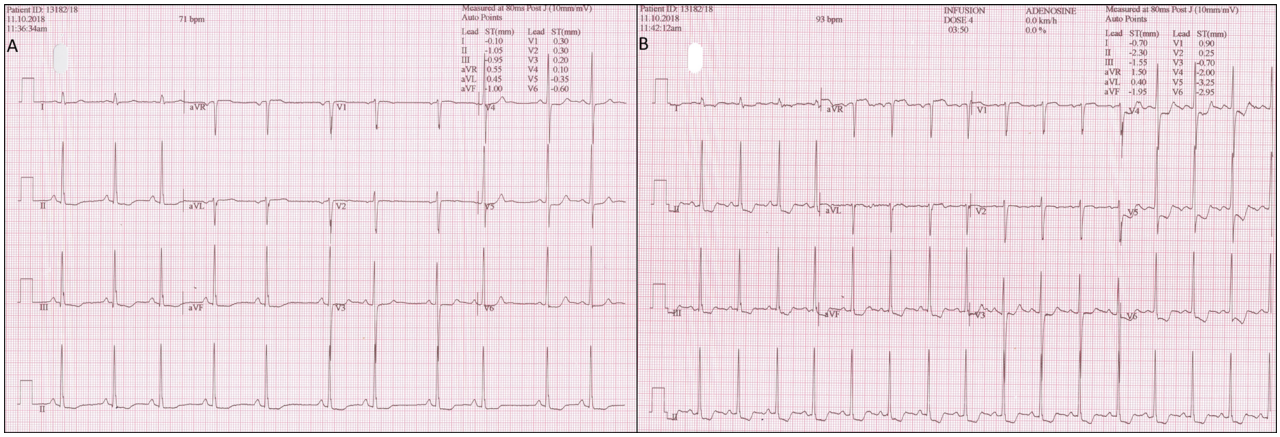

Figure 1. Rest electrocardiogram (**A**) showed mild ST-segment depression with T-wave inversion in inferior leads and mild ST-segment depression in lateral leads which got accentuated during peak stress (**B**) with significant ST-segment depression (down-sloping) in leads II, III, aVF and V3-V6.

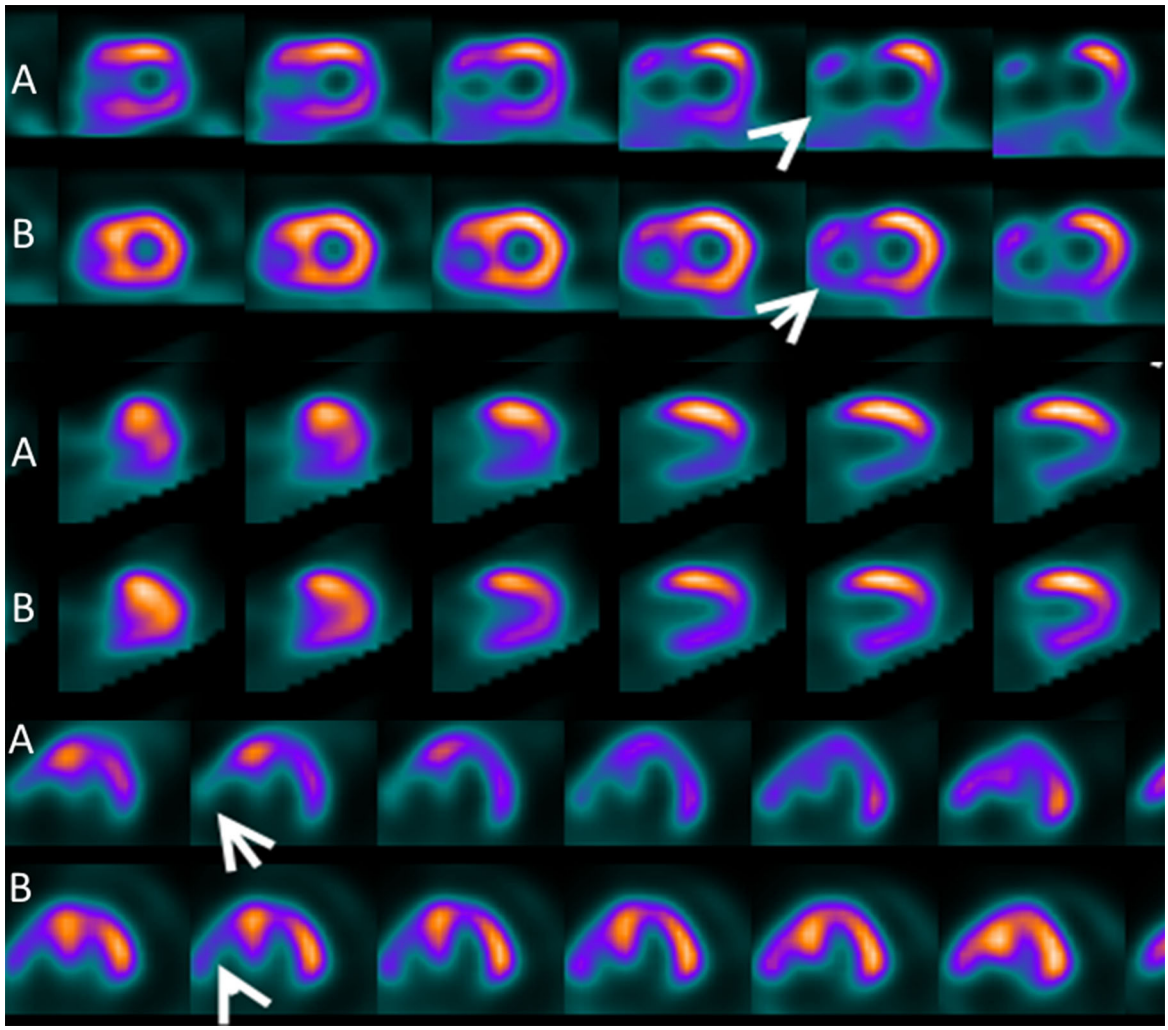

Figure 2. One day adenosine stress/rest MPI images in SA, VLA and HLA slices (**A**: stress attenuation corrected, **B**: rest attenuation corrected) showing reversible perfusion defects in the inferior wall of LV as well as the free and inferior walls of RV (highlighted with arrows in short axis and HLA slices). *SA*, short axis; *VLA*, vertical long axis; *HLA*, horizontal long axis.

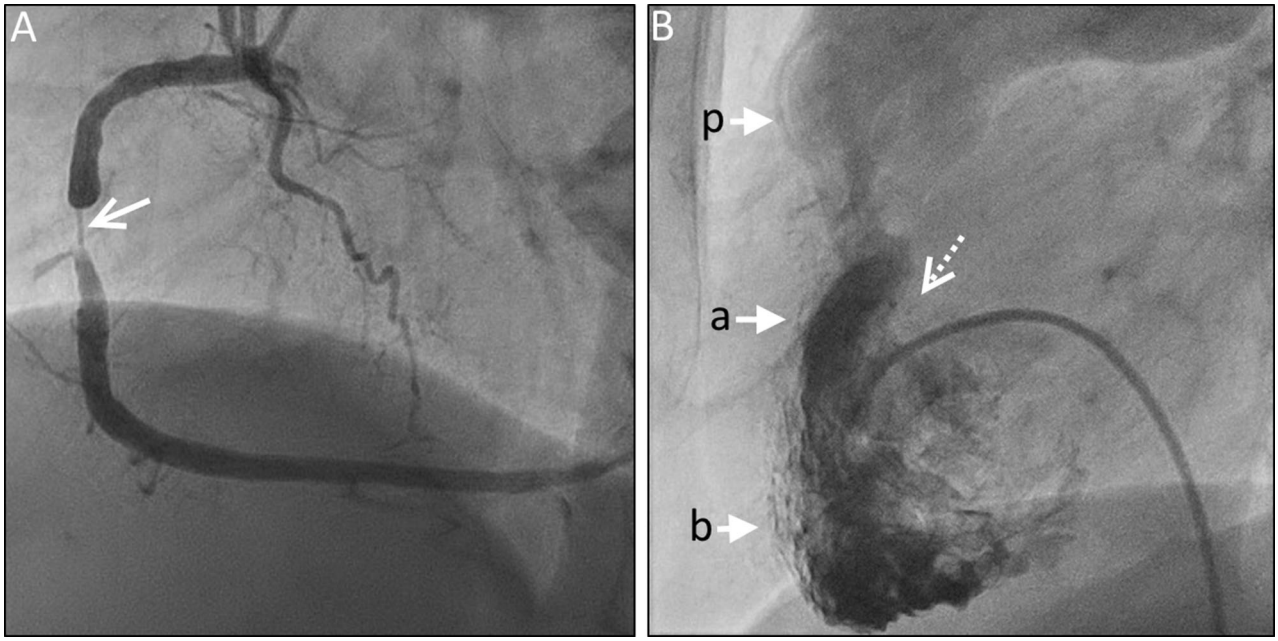

Figure 3. Coronary angiogram done after two days of stress/rest SPECT MPI (**A**) showing a significant (95%) stenosis in the proximal right coronary artery (arrow). The RV catheterization study (**B**) shows an anomalous muscle band (dotted arrow) dividing the RV cavity into a proximal high pressure chamber (a) and a distal low pressure chamber (b) leading to the diagnosis of double chambered right ventricle (DCRV). The proximal chamber systolic pressure was of 160 mm Hg and distal chamber systolic pressure of 40 mm Hg with gradient of 120 mm Hg; p-pulmonary valve.

visualized in imaging. RV myocardial uptake may allow perfusion defects visualization especially associated with LV inferior wall defects. Limited studies have explored the feasibility of MPI in detection and quantification of RV perfusion with variable success[4] which may be possible with emerging new SPECT cameras. The patient is planned for coronary artery bypass grafting along with resection of the AMB.

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