Flip-flop right ventricle myocardial perfusion on stress-rest ^{99m}Tc-MIBI myocardial perfusion scintigraphy: An indirect evidence for severe left ventricular coronary arterial disease?

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INTRODUCTION

Newer gamma cameras with better spatial resolution and use of ^{99m}Tc-based tracers have revived the interest in evaluation of right ventricular (RV) myocardial perfusion defects in addition to left ventricular myocardial perfusion assessment.[1] We present a case of reversible perfusion defect in left anterior descending (LAD) arterial territory resulting in predominant visualization of RV myocardium in post-stress myocardial perfusion imaging (MPI) imaging compared to rest images.

CASE SUMMARY

A 64-year-old long-standing diabetic woman on medical treatment for the past 5 years presented with anginal pain on exertion and NYHA-II dyspnoea worsening to class III for the last 6 months. She had a regular peripheral pulse rate and blood pressure. 2D echocardiogram showed regional wall motion abnormalities in LAD territory. Her rest electrocardiogram (Figure 1A) showed occasional ventricular premature contractions with significant ST-segment depression (down-sloping) in leads II, III, aVF, and V3-V6 at peak stress (Figure 1B) and slow recovery (>3 minutes) in 1-day adenosine stress/rest ^{99m}Tc-sestamibi gated SPECT/CT MPI. MPI images showed reversible perfusion defect in LAD territory with predominant RV wall visualization in post-stress imaging (Figure 2). Coronary angiography showed complete luminal stenosis in proximal LAD with significant collateral vessels formation from right coronary artery (RCA) (Figure 3). The patient is planned for bypass graft.

DISCUSSION

The index case showed increased RV myocardial uptake in post-stress MPI image likely due to proximal LAD stenosis manifesting as severe perfusion defect with flow diverting to RCA (coronary steal phenomenon) in post-stress image. However, the presence of significant collateral circulation from RCA to left arterial system maintained the perfusion in LAD territory at rest. This alternate diversion of blood in stress and rest may have led to the flip-flop perfusion of left and right systems during stress/rest imaging. Visualization of RV myocardium post-stress is postulated as a poor prognostic sign and an indirect evidence of severe left-sided CAD/global ischemia.[2,3] This case showed severe proximal LAD territory stenosis, but the development of collaterals from RCA with retrograde flow to LAD salvaged the myocardial perfusion at rest thereby making LAD intervention as a viable treatment option.

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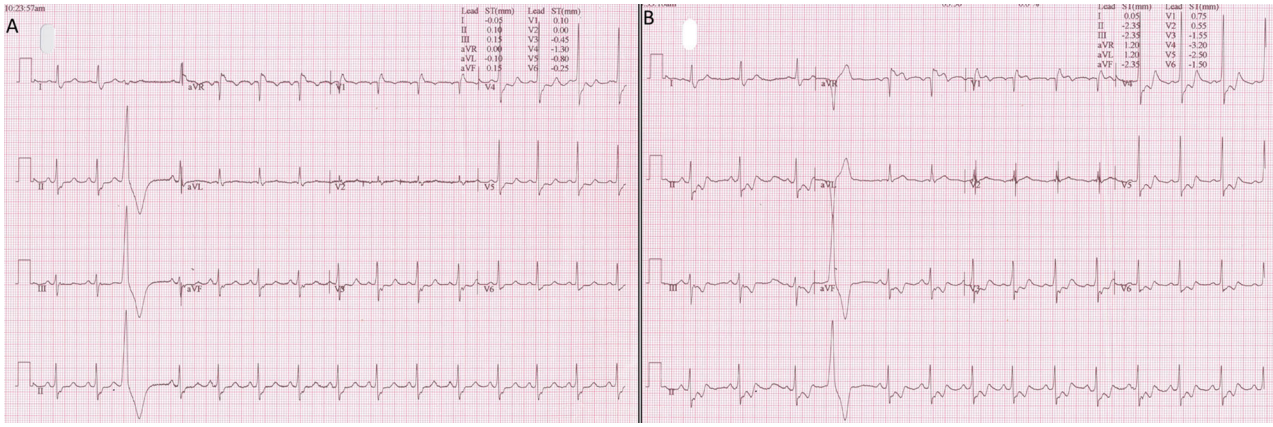

Figure 1. Rest electrocardiogram (**A**) showed normal rhythm with occasional ventricular premature contractions. During peak stress (**B**) there was significant ST-segment depression (down-sloping) in leads II, III, aVF, and V3-V6.

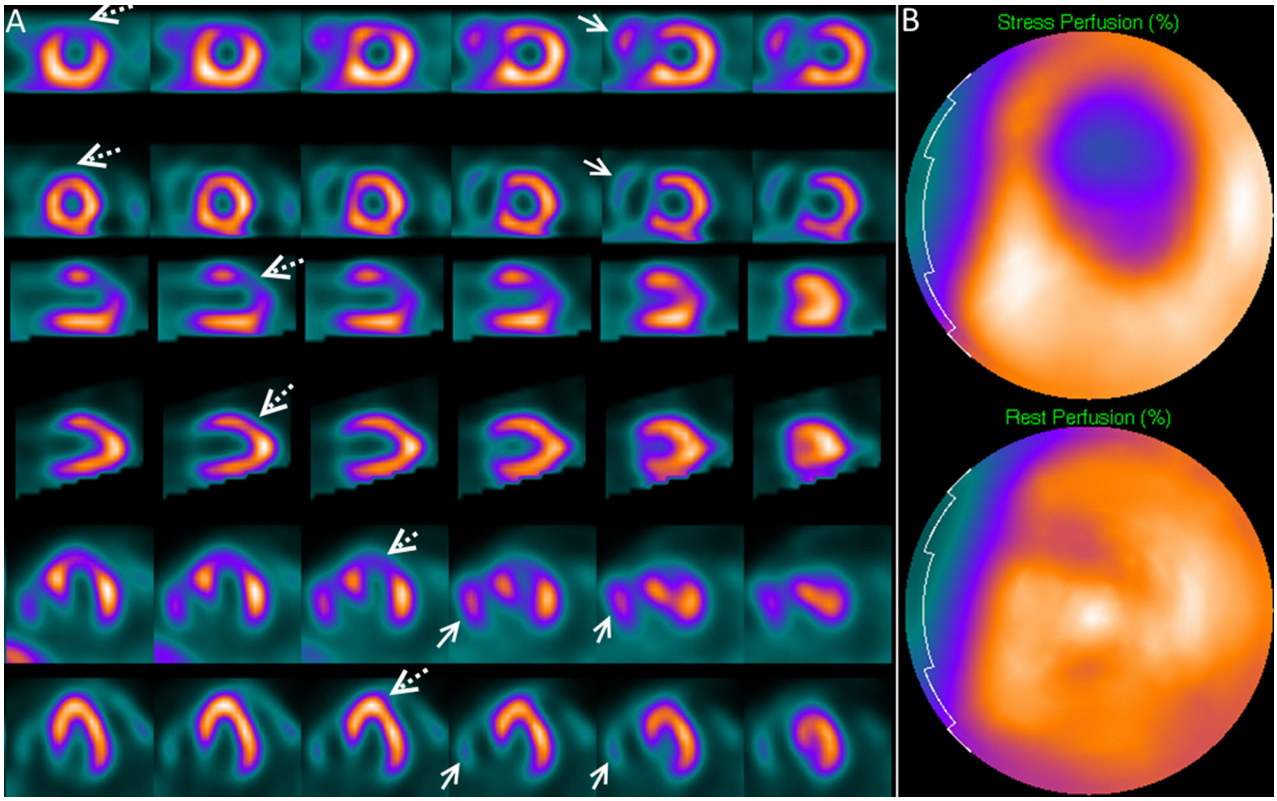

Figure 2. One-day adenosine stress/rest MPI images (**A**: attenuation corrected) in SA, VLA, and HLA slices (upper panel: stress, lower panel: rest) showing reversible perfusion defects in the anterior wall of the LV myocardium (dotted arrows) with predominant visualization of the walls of RV during post-stress images compared to the rest images (solid arrows in short axis and HLA slices). The polar maps (**B**) post-stress (upper) and post-rest (lower) show significant reversible perfusion defect in the anterior wall (LAD territory). *SA*, short axis; *VLA*, vertical long axis; *HLA*, horizontal long axis.

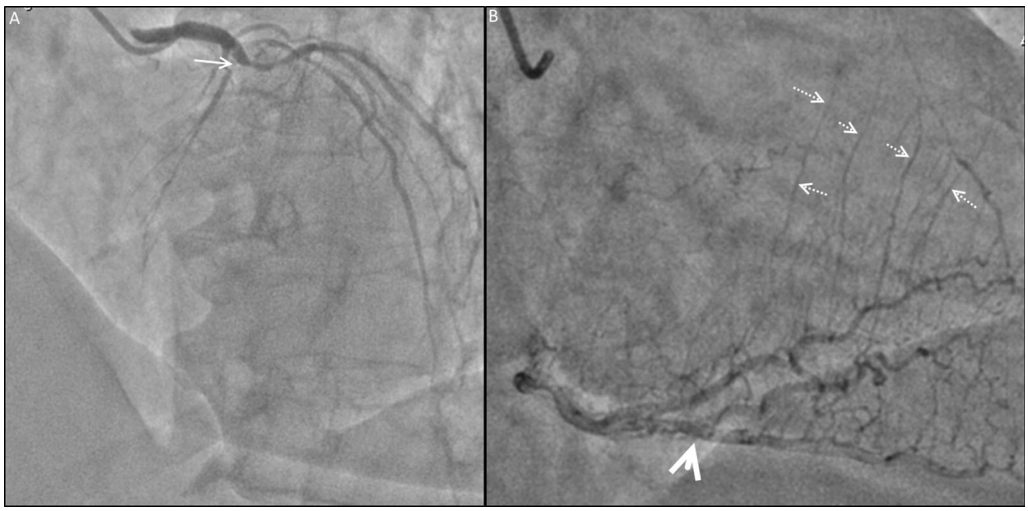

Figure 3. Coronary angiography showing a complete stenosis in the proximal left anterior descending artery with its non-formation (**A**: arrow). There was presence of multiple collaterals (**B**, dotted arrows) channeling blood from the RCA (arrowhead) with retrograde flow to the LAD myocardial territory thereby maintaining perfusion of the anterior wall at rest.

Disclosures

Dr. Shelvin Kumar Vadi, Saurabh Mehrotra, Ashwani Sood, Madan Parmar, Vaishnavi Dasagrandhi, Komalpreet Kaur, Bhagwant Rai Mittal have nothing to disclose. No financial was received for the publication for this manuscript.

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