



One stop non-invasive identification of culprit vessels and related ischemia in coronary artery bypass patient using combined ^{82}Rb PET/coronary CT angiography

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Ischemia testing in coronary artery bypass graft surgery (CABG) patients remains challenging due to variability of blood flow post-surgery, impaired vessel response to stress agents, advanced native vessel disease, and others [1]. Hence, clinicians refer post-CABG patients with suspected myocardial ischemia directly for invasive coronary angiography (ICA), which is often not only inconclusive but also risk- and cost-related. ^{82}Rb PET/CT has proven prognostic value in predicting mortality and cardiac death in CABG patients [2]. Combination of ^{82}Rb PET/CT and coronary CT angiography (CCTA) with hybrid 3D fusion is feasible with new-generation PET/CT devices [3]. Matching the ischemic territory with the potential culprit vessel or failed graft by 3D visualization of hybrid PET/CCTA accurately helps in further intervention planning (e.g. complex percutaneous coronary intervention (PCI) of the grafts or the native coronary vessels) [4, 5].

We present a case of a 52-year-old male diabetic patient, who was diagnosed with triple-vessel coronary artery disease (CAD) 2 years ago and underwent CABG (left internal mammary artery (LIMA) to left anterior descending (LAD), RIMA to OM1 and OM2, and vein to

posterior descending artery (PDA)). Five months later, he underwent PCI with two stents in OM1 due to bypass occlusion. Furthermore, 5 months later, he underwent re-PCI with insertion of two additional stents in OM1 due to new angina. Ten months later, he presented with recurrent chest pain.

^{82}Rb PET/CCTA revealed relevant ischemia (C) and decreased flow reserve (D) in the lateral wall (A: stress, B: rest, C: reversibility polar plot, D: flow reserve) (mean myocardial flow reserve for LAD: 2.26 ml/g/min, LCX: 0.92, RCA: 1.93; threshold used: 2.0). Unremarkable LIMA to LAD and vein to PDA grafts were seen in CCTA, and occluded grafts to OM1 and OM2 (Fig. 1b). Fused hybrid 3D images (E: stress, F: rest, G: reversibility, H: 3D CCTA) demonstrated that the ischemia matched to the OM1 and OM2 branches of the left circumflex artery (LCX). ICA confirmed significant stenosis of OM1 and OM2 (I), which were treated successfully by PCI (J).

^{82}Rb PET/CCTA offers important ‘one-stop’ non-invasive true 3D hybrid images for visualisation and identification of ‘culprit’ stenosis and related ischemia in complex CABG patients, and therefore, facilitates precise planning of therapeutic interventions.

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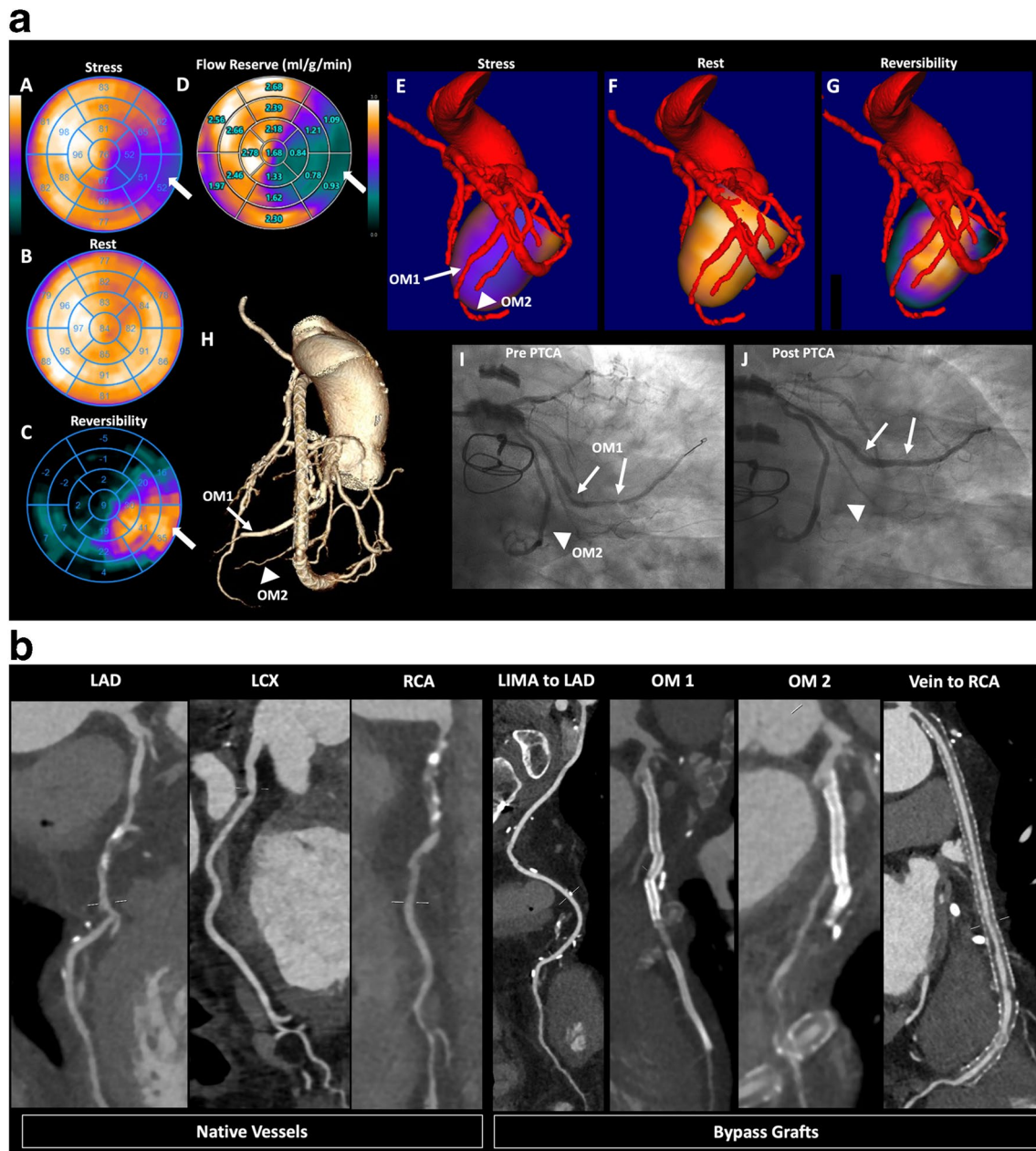
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Data Availability The data underlying this article will be shared on reasonable request to the corresponding author.

Declarations

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent to participate Obtained.

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Conflict of interest The authors declare no competing interests.

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