

## Noninvasive Diagnosis of Culprit Lesions with the Use of Single-Photon Emission Computed Tomography/Computed Tomography Fusion Images in Patients with Multivessel Coronary Artery Disease

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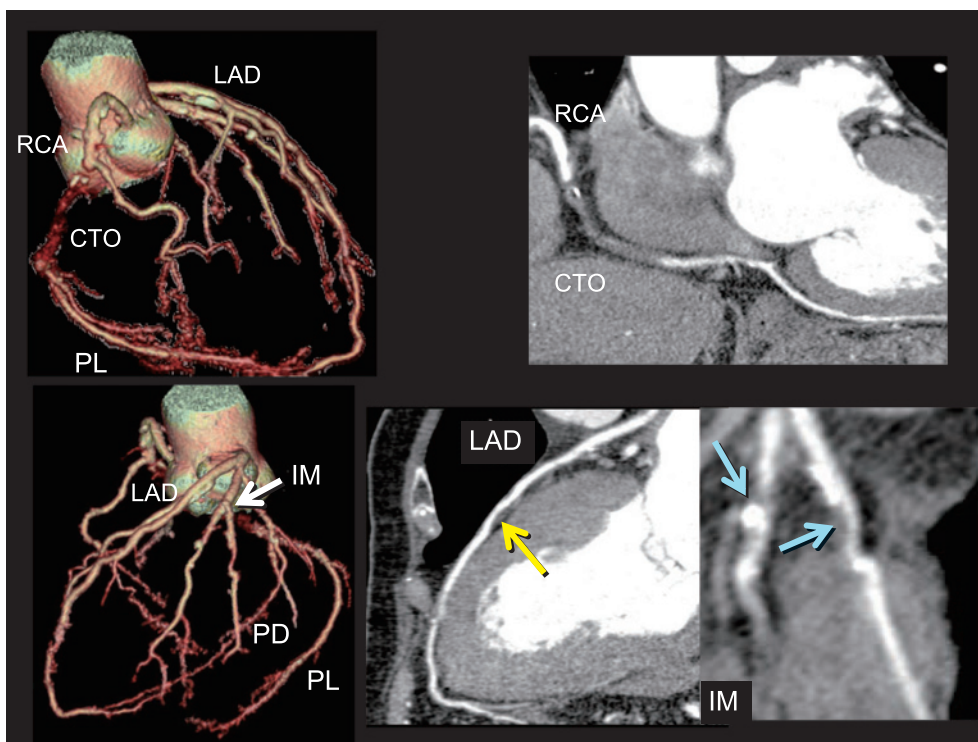


Fig. 1

Coronary computed tomography (CT) enables noninvasive, highly diagnostic visualization of coronary artery stenosis. However, identifying culprit lesions in patients with multivessel coronary artery stenoses is difficult. Cardiac single photon emission computed tomography (SPECT) shows ischemic regions with high diagnostic accuracy, although evaluating the vascular territory supplied by each coronary artery is difficult. Fusion of coronary CT images and cardiac SPECT images allows accurate identification of the coronary artery supplying the ischemic region. This novel technique enables noninvasive diagnosis of culprit lesions requiring revascularization.

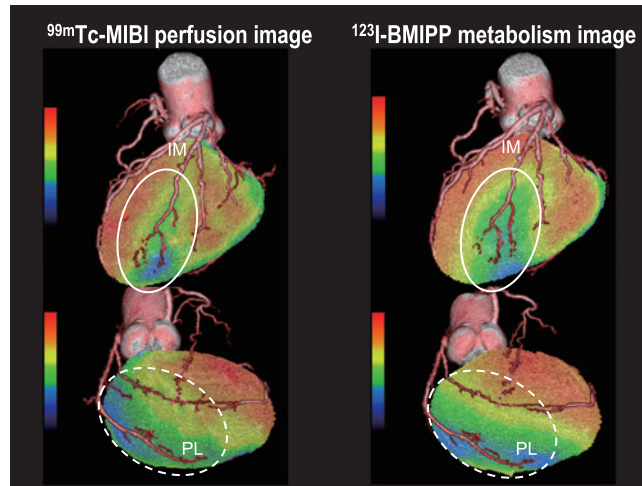


Fig. 2

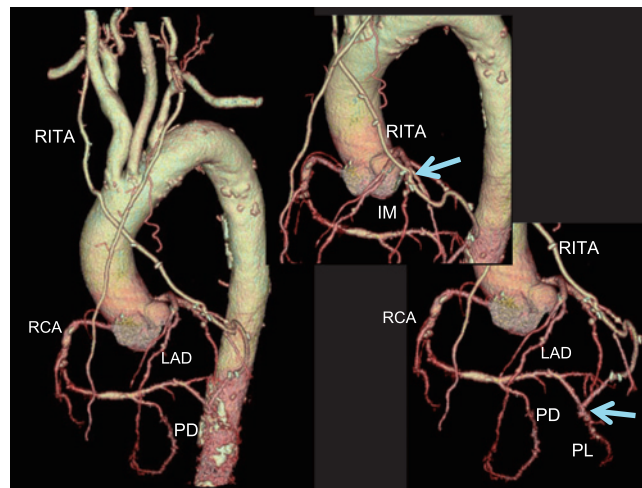


Fig. 3

- Fig. 1** Coronary CT in a patient with an old myocardial infarction  
 Coronary CT demonstrates chronic total occlusion (CTO) of the right coronary artery (RCA), a 50% stenosis of the left anterior descending artery (LAD: **yellow arrow**), and multiple stenoses of the intermediate artery (IM: **blue arrow**). PD: posterior descending artery. PL: posterolateral branch.
- Fig. 2** SPECT/CT fusion images  
 Fusion images obtained with  $^{99m}\text{Tc}$ - methoxy-2-isobutyl isonitrile myocardial perfusion SPECT and coronary CT (left) demonstrate reduced perfusion (indicated by the green-to-blue color code) in the apex and anterior wall (solid ellipse) supplied by the intermediate artery (IM), and in the posteroinferior wall (dashed ellipse) supplied by the posterolateral branch (PL) of the RCA. Reduction in fatty acid metabolism by  $^{123}\text{I}$ - beta-methyl iodophenyl pentadecanoic acid (right) was even greater in these areas (perfusion/metabolism mismatch), suggesting the need for revascularization.
- Fig. 3** Coronary CT images after coronary artery bypass grafting  
 SPECT/CT fusion images showed that the intermediate artery and the posterolateral branch were the arteries responsible for causing ischemia, and, thus, the right internal thoracic artery (RITA) was grafted sequentially to these arteries (**arrows**: anastomotic sites).