

Detection of impaired fatty acid metabolism in right ventricular hypertrophy: Assessment by I-123 β -methyl iodophenyl pentadecanoic acid (BMIPP) myocardial single-photon emission computed tomography

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Fatty acid metabolism has been reported to be impaired earlier than myocardial blood flow in left ventricular hypertrophic myocardium, e.g., in hypertrophic cardiomyopathy or hypertensive heart disease. The purpose of this study was to determine whether impaired fatty acid metabolism also occurs in right ventricular (RV) hypertrophy. The subjects consisted of 6 patients with chronic obstructive pulmonary disease, 4 with primary pulmonary hypertension, 2 each with refractory pulmonary tuberculosis, tricuspid insufficiency, pulmonary embolism, 1 each with atrial septal defect, ventricular septal defect (Eisenmenger complex), Ebstein anomaly, and endocardial defect, and 7 healthy controls. SPECT imaging with Tl-201 (Tl) and I-123 β -methyl iodophenyl pentadecanoic acid (BMIPP), and Tc-99m RBC first pass and gated blood pool scintigraphy were performed. Based on Tl planar images, the subjects were classified into 3 groups: 7 patients with no RV visualization (Group A), 11 with moderate RV visualization (Group B) and 9 with marked RV visualization (Group C). As a semi-quantitative evaluation by Tl myocardial SPECT, 3 regions in 3 representative short axial images were divided into 9 segments, each of which was graded from 0 to +3, and their sum was calculated as the RV score. The right ventricular ejection fraction (RVEF) and the left ventricular ejection fraction were obtained by Tc-99m RBC cardiac scintigraphy. The groups with marked visualization of the right ventricle had lower RVEF ($p < 0.01$), and there was a good correlation between the RVEF and the RV score with both Tl and BMIPP (Tl: $r = -0.79$, BMIPP: $r = -0.70$). Although a good correlation was demonstrated between the RV score with Tl and BMIPP in Groups A and B ($r = 0.86$, $p < 0.001$), in Group C, in which there was marked RV Tl visualization, the RV score with BMIPP was significantly smaller than with Tl (BMIPP vs. Tl: 11.5 ± 3.7 vs. 16.4 ± 3.8 , $p < 0.01$). These findings suggest that impaired fatty acid metabolism may exist in severely hypertrophic right ventricle due to RV overload.

Key words: I-123 BMIPP, Tl-201, right ventricular overload, SPECT, myocardium