Prosthetic valve dysfunction in repaired tetralogy of Fallot: assessment by FDG-PET and 256-slice 4D-CT

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A 26-year-old woman who had undergone right ventricular outflow tract reconstruction and biological pulmonary valve replacement for tetralogy of Fallot 20 years earlier presented with fever of unknown origin and anterior chest pain. Fluorodeoxyglucose (FDG)-positron emission tomography (PET) was performed to detect inflammatory foci, and revealed a localized high-uptake area (maximum standardized uptake value, 9.4) around the replacement valve. Pulmonary regurgitation, but not valve leaflet movement or vegetation, was revealed on transoesophageal echocardiography (Panel A and Supplementary data online, Video S1). Retrospective ECG-gated 256-slice CT demonstrated an obvious pulmonary valve dysfunction, showing a fixed leaflet throughout a cardiac cycle and pulmonary regurgitation (Panels B and D: diastolic phase, Panels C and E: systolic phase, and Supplementary data online, Videos S2 and S3). Delayed-phase imaging showed soft tissue thickening at an area corresponding to the high-uptake area of FDG (Panels F and G). Owing to infective endocarditis and pulmonary valve dysfunction, re-operation was immediately performed.

Prosthetic valve dysfunction and infective endocarditis are life-threatening complications after prosthetic valve replacement. FDG-PET is promising tools to diagnose endocarditis in patients with an inconclusive routine work-up with echocardiography. Retrospective ECG-gated CT allows four-dimensional visualization, and enables dynamic leaflet evaluation and anatomic assessment. Although echocardiography has a limited acoustic window due to the implanted metal components, CT has no such limitations; therefore, it is clinically useful for evaluating prosthetic valve dysfunction. Besides prosthetic valve assessment, CT also provides information valuable for planning repeat surgery. Multimodality assessment contributes additional diagnostic value to the evaluation of prosthetic valve dysfunction and may guide therapeutic strategies.

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