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Infective endocarditis involving all native heart valves diagnosed by 18F-FDG PET

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Infective endocarditis (IE) is a severe valvular disease associated with high morbidity and mortality [1]. Positron emission tomography with fluorodeoxyglucose (^{18}F-FDG PET) is a valuable tool for diagnosing IE, as confirmed in the recent 2023 European Society of Cardiology guidelines for the management of endocarditis. The method is highly sensitive and specific for prosthetic valve endocarditis, but less diagnostic for native valve endocarditis (NVE) [2]. Therefore, echocardiography and computed tomography, rather than PET, are major diagnostic tools in the NVE imaging [3].

We present the case of a patient in whom an extremely rare IE affecting all native heart valves was diagnosed with ^{18}F-FDG PET.

This is a case of a 58-year-old male patient with a history of lung cancer who had undergone chemotherapy and radiotherapy for brain metastases. He had lost approximately 30 kg of body weight over the past three months, showed symptoms of weakness and reduced

exercise tolerance, and for several weeks had presented with a subfebrile state and profuse sweating. A ^{18}F-FDG PET scan was recommended by the pulmonologist to assess the expected recurrence of a previously known malignant process. The scan demonstrated no signs of metabolically active lesions in the lungs, while also indicating a focus of increased apparent ^{18}F-FDG uptake in the tricuspid and a faint suspicious focus of radiotracer accumulation in the mitral valve region (Figure 1A).

Laboratory tests revealed C-reactive protein 29.2 mg/dl, procalcitonin 2.83 ng/ml with unremarkable other test results.

Transthoracic and transesophageal echocardiography examination was performed and confirmed PET results and revealed IE involving all heart valves, preserved left ventricular ejection fraction (60%), moderate to severe aortic valve and mitral valve regurgitation and severe tricuspid valve regurgitation. Within the anterior leaflet of the mitral valve, a 17 × 10 mm structure was identified (Figure 1A–B). A mobile structure 11 × 8 mm was observed in conjunction with posterior tricuspid valve leaflet. Heterogeneous echo structures were observed in association with the aortic valve, penetrating the left ventricular outflow tract, 1 × 4 mm and 1 × 4 mm (Figure 1B–C). Blood cultures were positive for *Streptococcus gallolyticus ssp gallolyticus*. Moreover, metastatic recurrence of lung cancer in the brain was also found, so the patient was scheduled for a conservative treatment.

Imaging infectious cardiac lesions in patients referred for oncological PET and unprepared with an adequate diet is challenging. A possible focus of increased glucose metabolism (vegetation) can be superimposed on physiological non-supressed uptake in viable myocardium [4]. Additional reasons for the low sensitivity of ^{18}F-FDG PET in NVE include the small size of the vegetations, insufficient temporal resolution, and the inflammatory response, which is less pronounced in a NVE vs. prosthetic valve endocarditis. However, in addition to the reduced possibility of demonstrating a focus of increased glucose metabolism on the valves, there are additional signs, e.g. increased diffuse ^{18}F-FDG uptake in the spleen and bone marrow, which can be considered as a potential new minor diagnostic criterion for NVE. [5]. Nevertheless, due to the low sensitivity in NVE, ^{18}F-FDG PET is used mainly to add minor IE criteria e.g. embolic vascular dissemination. It is also an excellent diagnostic tool in patients with fever of unknown origin, and for diagnosing cancer foci, which are often the cause of weight loss, sweating and weakness, as in the patient described above.

Article information

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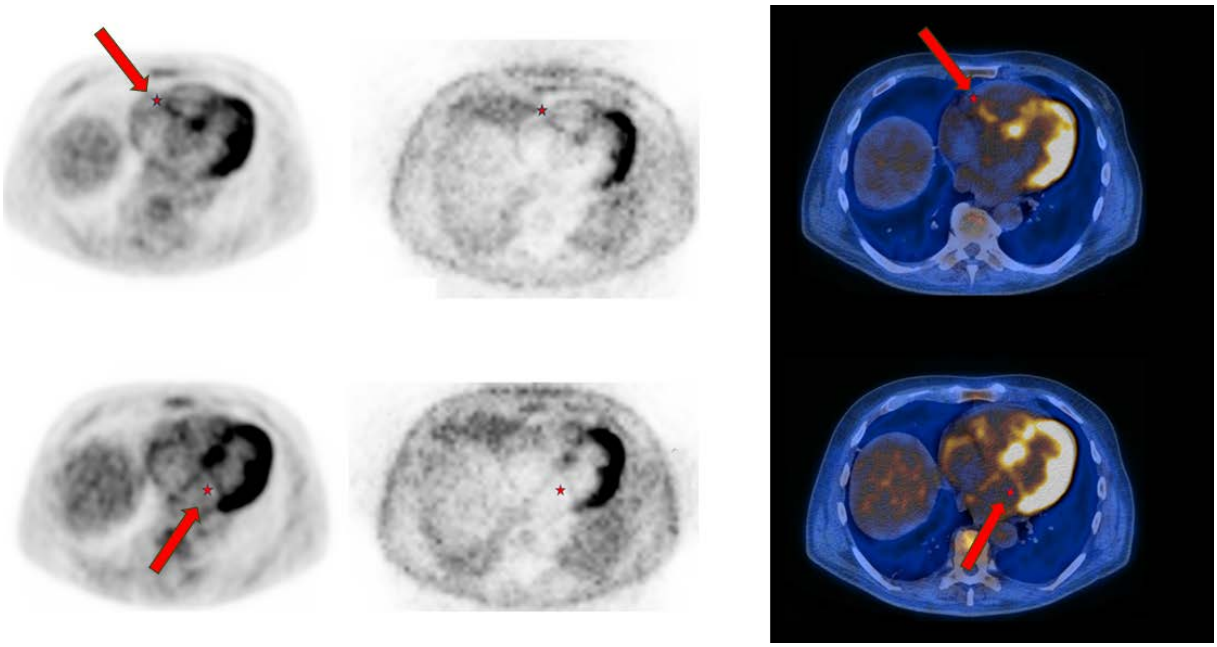

Figure 1. A. Axial ^{18}F-FDG PET/CT scans. Physiological tracer uptake in the myocardium - scan for oncological indications without dietary myocardial suppression. There is also a visible accumulation of tracer in the muscle of both atria as an expression of their overload. Upper row: apparent pathological focal tracer uptake at the native tricuspid valve site (indicated by an arrow and red asterisk). Lower row: faint uptake at the mitral valve site. From left to right: axial PET images with attenuation correction, axial PET images without attenuation correction (NAC), hybrid axial PET-CT scan

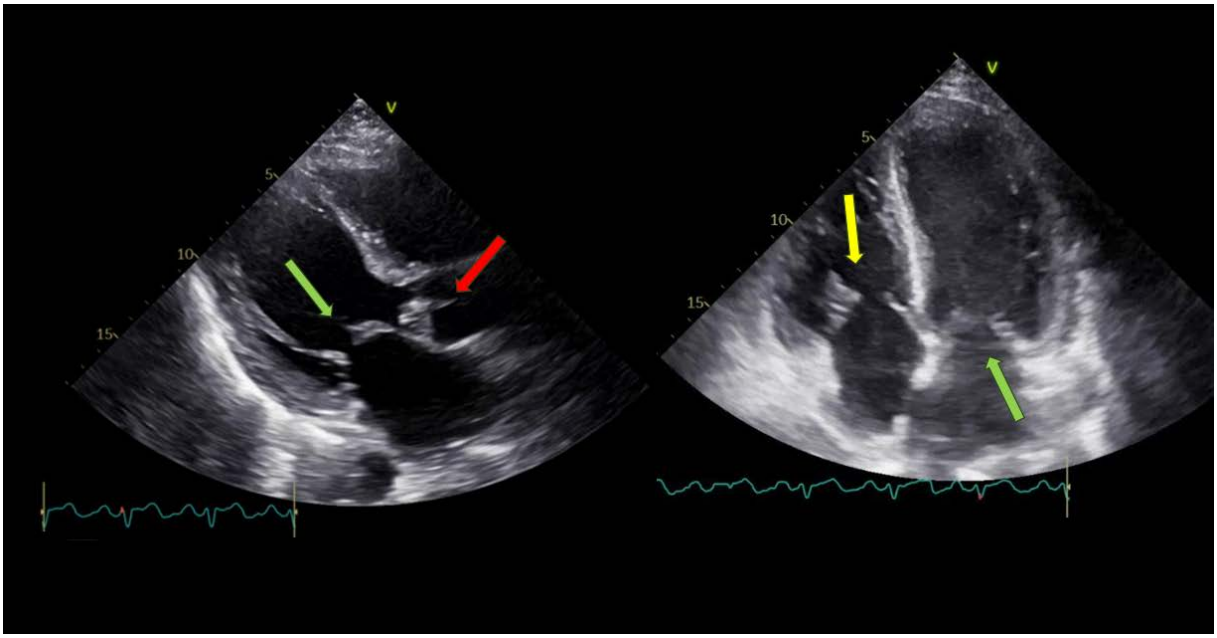

Figure 1. B. 2D transthoracic echocardiography: mitral (green arrow), aortic (red arrow) and tricuspid (yellow arrow) valves with visible vegetations in the course of infective endocarditis;

mitral valve — vegetation covers the anterior leaflet of the valve, significantly thickened; aortic valve — an additional echo is visible in the left ventricular outflow tract, tricuspid valve — a ballot structure described on the border of the right ventricle and the valvular apparatus, connected with the posterior leaflet of the valve

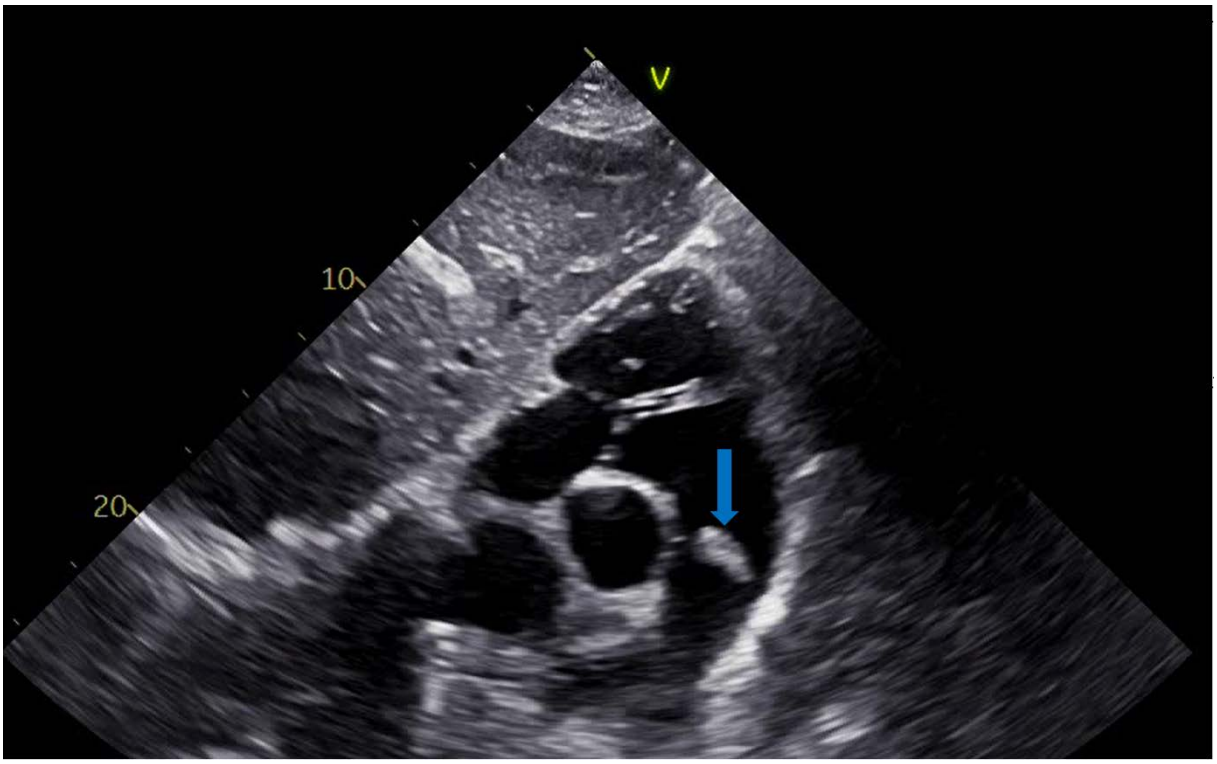

Figure 1. C. Echocardiographic examination — image of vegetation on the pulmonary valve (blue arrow)