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Use of positron emission tomography with fluorodeoxyglucose to differentiate additional masses on the bioprosthetic mitral valve

Short title: Use of ^{18}F-FDG PET/CT in the diagnosis of valvular heart lesions

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A 60-year-old male was admitted to the neurology department with motor aphasia and right lower limb weakness, accompanied by exacerbation of heart failure (New York Heat Association IV). His medical history included ischemic heart failure with reduced ejection fraction of 20%, cardioverter-defibrillator implantation (2017), and bioprosthetic mitral valve (MV) replacement (2019). Following the diagnose of ischemic stroke, intravenous thrombolysis with recombinant tissue plasminogen activator was administered, resulting in complete resolution of the neurological symptoms. Atrial fibrillation was excluded through Holter monitoring and carotid ultrasound showed no abnormalities. Transthoracic echocardiography (TTE) revealed no thrombi in heart chambers, and the bioprosthetic MV gradient was consistent with previous studies. The patient was diagnosed with cardioembolic stroke and transferred to the department of internal medicine for further treatment. One week later, the patient returned to the cardiology department with suspected infective endocarditis

(IE). He experienced recurrent right lower limb weakness. Laboratory test showed elevated inflammatory marker (C-reactive protein 100 mg/ml), though no obvious source of infection was identified. Chest X-ray showed right lung fibrosis but no evidence of pneumonia. Multiple blood cultures remained negative. A repeated TTE showed no changes from the previous study (Figure 1A; Supplementary material, *Video S1*). Given the clinal suspicion of IE, transesophageal echocardiography (TOE) was performed, revealing additional masses on the bioprosthetic mitral valve and thickening of its apparatus (Figure 1B; Supplementary material, *Video S2*). Spontaneous echo contrast was noted in the left atrium, though no thrombus was found in the left atrial appendage. No device-related masses were identified (Supplementary material, *Video S3*). Based on the modified Duke criteria, a possible diagnosis of IE was considered [1]. As the echocardiographic findings combined with clinical presentation were inconclusive for IE, further imaging with positron emission tomography with fluorodeoxyglucose (^{18}F-FDG positron emission tomography/computed tomography [PET/CT]) was arranged. Meanwhile, dental examination revealed chronic periodontitis requiring tooth extraction. The treatment was initiated with empiric antibiotic therapy dedicated to IE and therapeutic dose of low molecular weight heparin due to the possibility of prosthetic valve thrombosis. ^{18}F-FDG PET/CT excluded IE but confirmed pneumonia in the right lung (Figure 1C–D). Following multidisciplinary discussion between cardiology and cardiothoracic teams, conservative management with low molecular weight heparin and targeted antibiotics for pneumonia was used. The treatment led to a reduction in inflammatory markers and a significant regression of the bioprosthetic MV lesions on follow-up TOE after one month (Figure 1E; Supplementary material, *Video S4*).

This case highlights the importance of a comprehensive diagnostic approach in unclear clinical scenarios. When first-line imaging with TTE and TOE proves inconclusive for IE, advanced diagnostic methods become necessary. ^{18}F-FDG PET/CT has emerged as a valuable tool in diagnosing prosthetic valve endocarditis and cardiac device-related endocarditis [1, 2]. However, its utility is more limited in native valve endocarditis [3]. Increased ^{18}F-FDG uptake signifies inflammatory activity, making PET useful in diagnosing inflammatory disorders of known and unknown etiology [4]. Accurate diagnosis of valvular lesions is crucial for appropriate management. In this case prosthetic valve thrombosis mimicking IE likely developed secondary to pneumonia, consistent with inflammation being a known risk factor of thrombotic complications [5].

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

Article information

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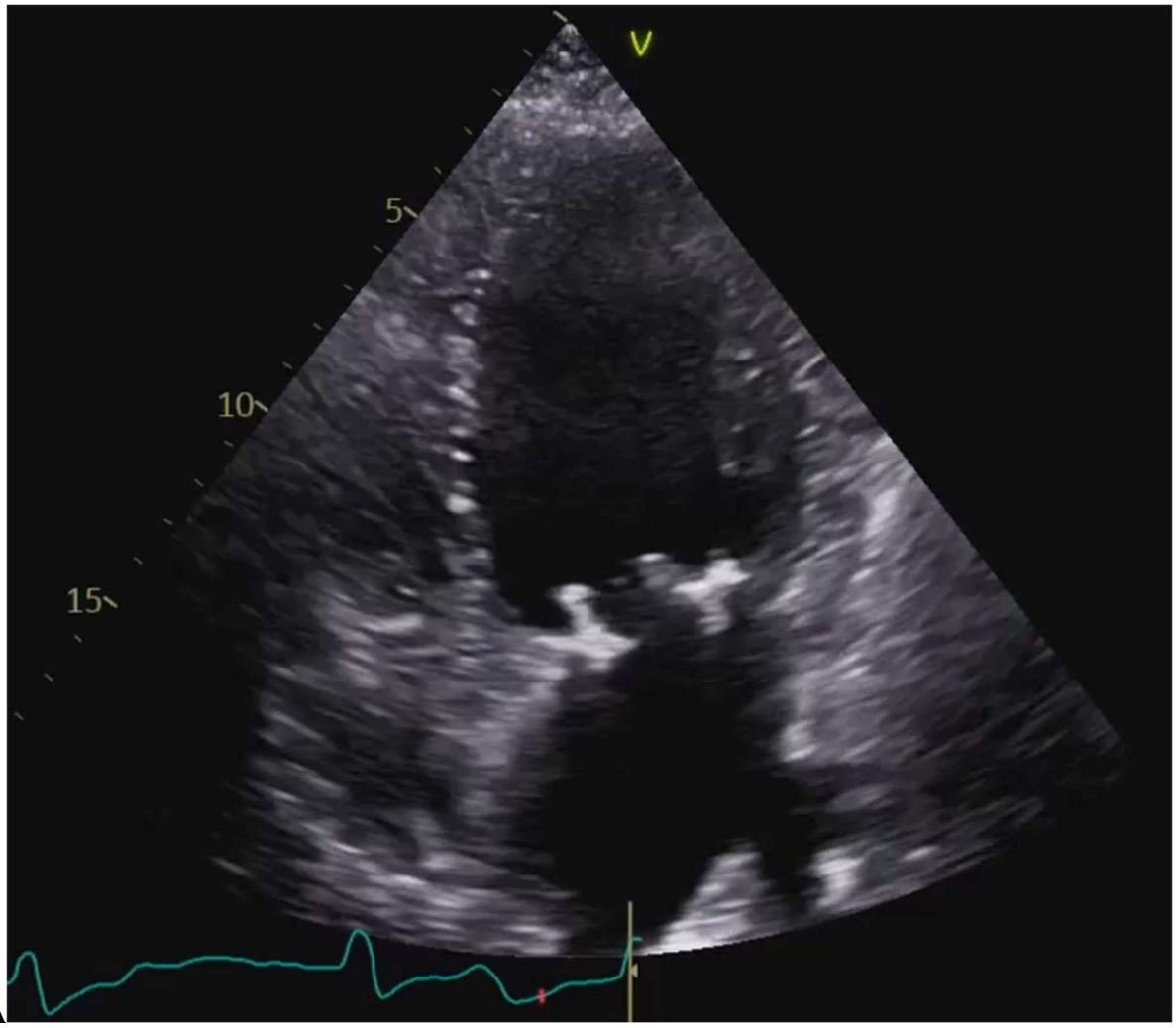
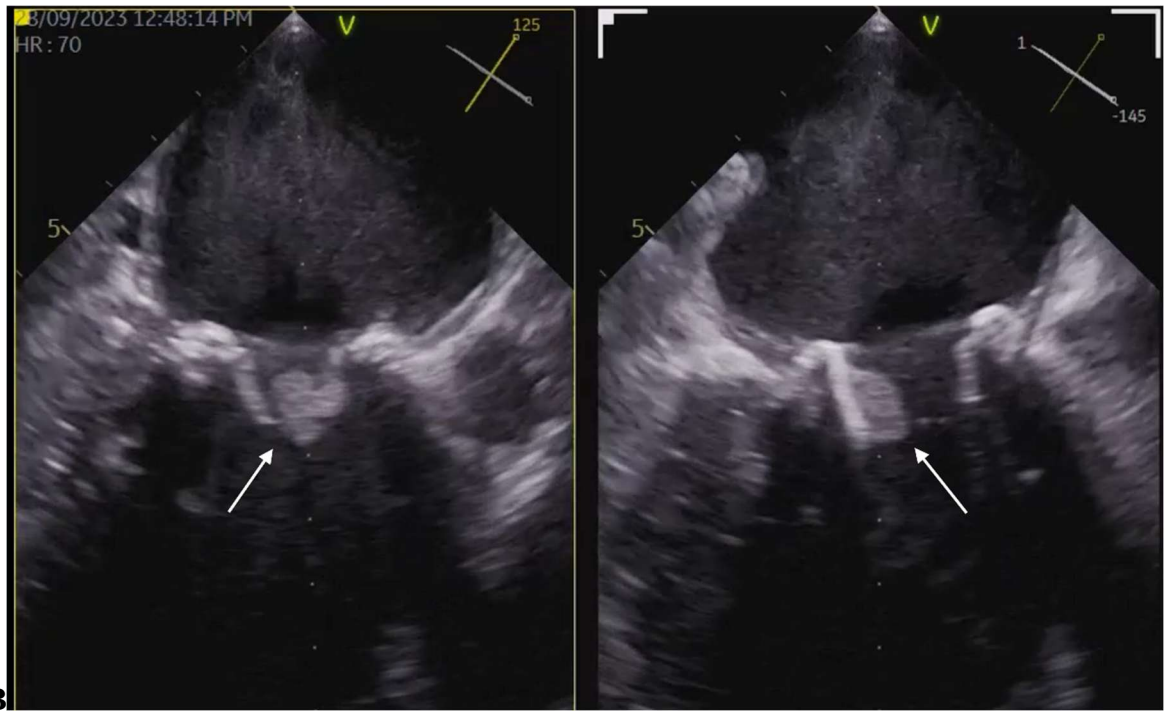


A



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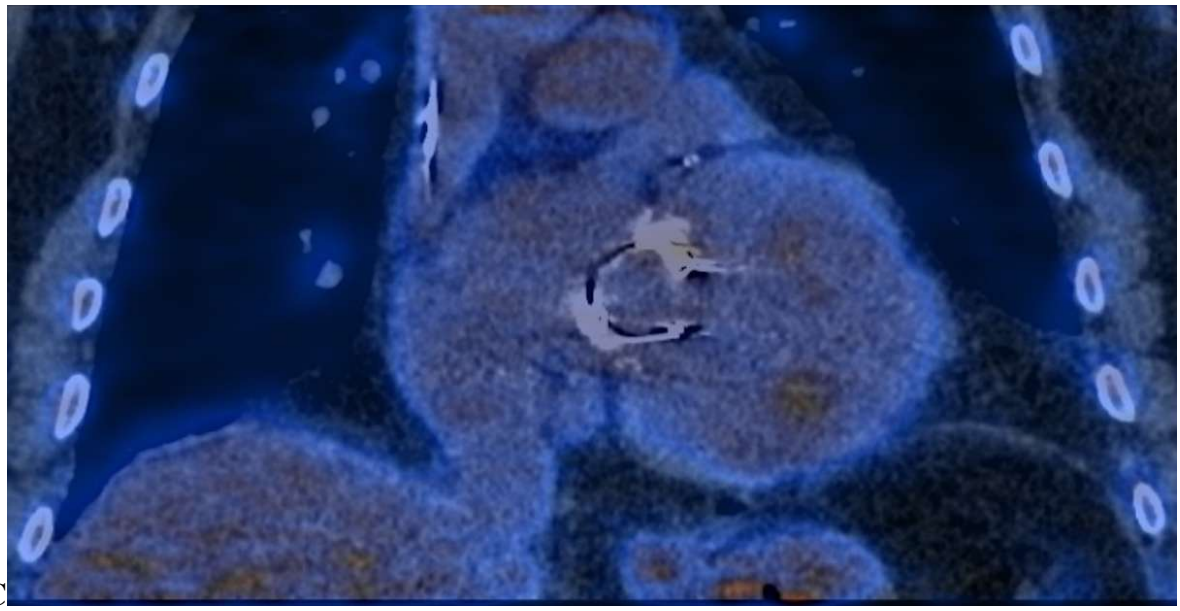
C 

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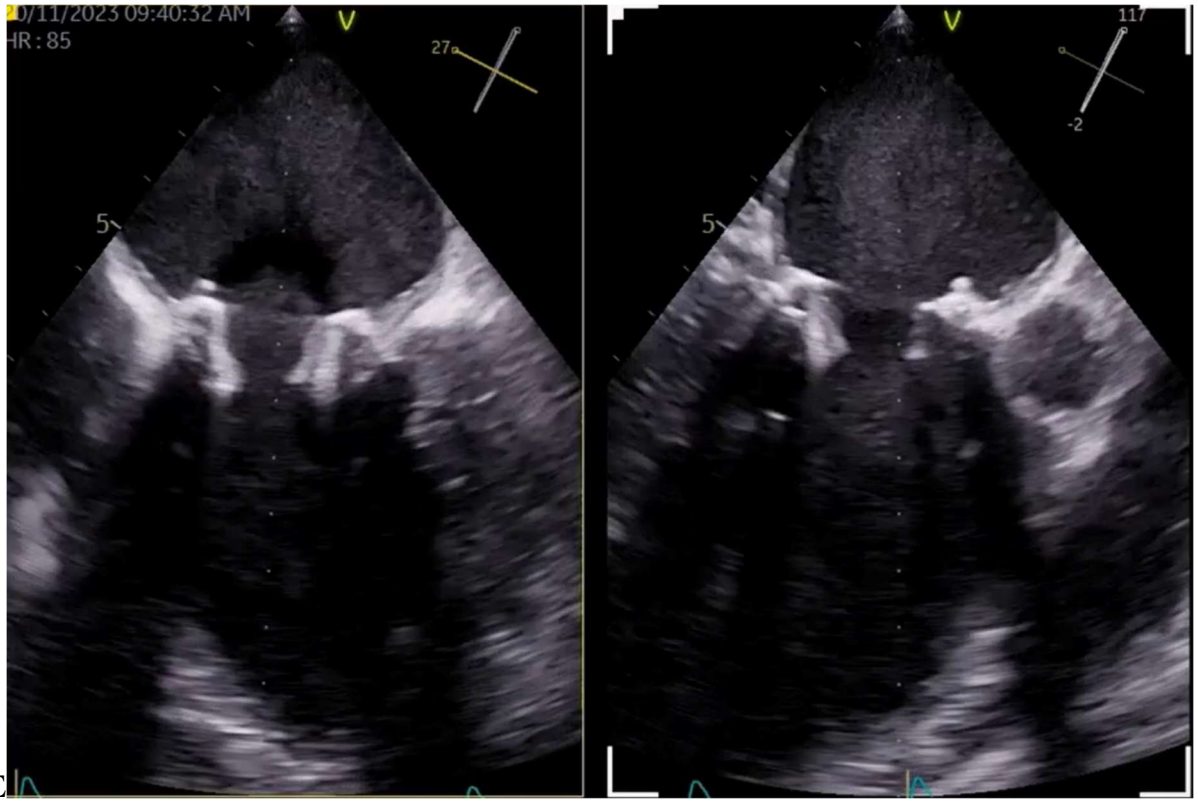

E

Figure 1. A. Transthoracic echocardiography showing bioprosthetic mitral valve without visible abnormalities. **B.** Transesophageal echocardiography showing additional masses on the bioprosthetic mitral valve (white arrows). **C.** Hybrid axial PET/CT scan without visible accumulation of tracer within heart valves. **D.** Hybrid axial PET/CT scan presenting visible accumulation of tracer in the lower part of right lung indicating pneumonia (white arrow). **E.** Follow-up transesophageal echocardiography showing significant reduction of lesions on the bioprosthetic mitral valve

Abbreviations: CT, computed tomography; PET, positron emission tomography