

The role of ^{18}F -fluorodeoxyglucose positron emission tomography / computed tomography imaging in the diagnosis of valve-in-valve endocarditis

Anna Burban^{1,2}, Agnieszka Kołodzińska¹, Małgorzata Kobylecka³, Joanna Mączewska³, Piotr Ścisło¹, Marcin Grabowski¹

¹ First Department of Cardiology, Medical University of Warsaw, Warsaw, Poland

² Doctoral School, Medical University of Warsaw, Warsaw, Poland

³ Department of Nuclear Medicine, Medical University of Warsaw, Warsaw, Poland

Infective endocarditis (IE) is a rare condition with an in-hospital mortality of 17.1% and 1-year mortality of up to 40%.^{1,2} It usually occurs in patients from high-risk groups, such as those with prosthetic valves or with prosthetic material used for cardiac valve repair, those with previous IE, or those with untreated cyanotic congenital heart disease.³ The recurrence rate is between 2% and 6%.³ If IE occurs at least 6 months after the previous infection, it indicates a reinfection.³

In March 2022, a 79-year-old man was admitted to the hospital for a suspected IE reinfection. The patient had undergone coronary artery bypass grafting and a biological aortic valve implantation in 2018, followed by IE in 2019. The infection destroyed the aortic valve leaflets, which led to severe aortic valve failure. In 2021, the patient had undergone a valve-in-valve transcatheter aortic valve implantation (TAVI), followed by a percutaneous therapy for severe mitral regurgitation with the MitraClip system 7 months later. He also had chronic kidney disease and had undergone an appendectomy 2 months before the admission.

The patient presented with fever (up to 40 °C) and shivering but had no symptoms related to the respiratory or urinary system. Physical examination revealed a heart rate of 76 bpm, blood pressure of 90/50 mm Hg, a systolic-diastolic heart murmur, crackles at the base of the lungs, and no peripheral edema. The level of C-reactive protein was significantly elevated (192 mg/l; reference range <10 mg/l). Blood culture was positive for *Staphylococcus hominis* and *Escherichia coli*. According to the antibiogram, antibiotic

therapy with ceftriaxone, vancomycin, and amikacin was implemented. Transthoracic and transesophageal echocardiography was performed, and neither showed any features of IE (FIGURE 1A and 1B). However, there was still a high probability and suspicion of IE as the patient belonged to a high-risk group (previous IE, presence of prosthetic valve material). Hence, after implementation of a low-carbohydrate / high-fat diet and the administration of 2500 IU of heparin on the second day of antibiotic therapy, whole-body ^{18}F -fluorodeoxyglucose positron emission tomography / computed tomography (^{18}F -FDG PET/CT) was performed. Inflammatory activity was found in the aortic valve annulus and at the arterio-superior part of the ascending aorta (FIGURE 1C–1E). No extracardiac foci were detected. Thus, after the PET/CT scan, the 2 main Duke criteria were met (2 positive blood cultures for IE and positive imaging results for IE), and the diagnosis of IE was confirmed. The patient received antibiotic therapy for 6 weeks. Five months later, a follow-up ^{18}F -FDG PET/CT scan showed no evidence of infection in the aortic valve (FIGURE 1F–1H).

In further retrospective analysis, the appendectomy performed 2 months before the admission to the hospital was evaluated as a likely source of infection. *E. coli* is not a typical etiologic agent of IE—only a few such cases have been described in the literature. Native valves without degenerative valvulopathy appear to be more susceptible to *E. coli* than prosthetic valves.⁴

The incidence of IE as a complication of TAVI is estimated at 0.2% to 3.1%.⁵ However,

Correspondence to:

Agnieszka Kołodzińska, MD, PhD,
First Department of Cardiology,
Medical University of
Warsaw, ul. Banacha 1A,
02-097 Warszawa, Poland,
phone +48 22 599 29 58, email:
agnieszka.kolodzinaska@wum.edu.pl

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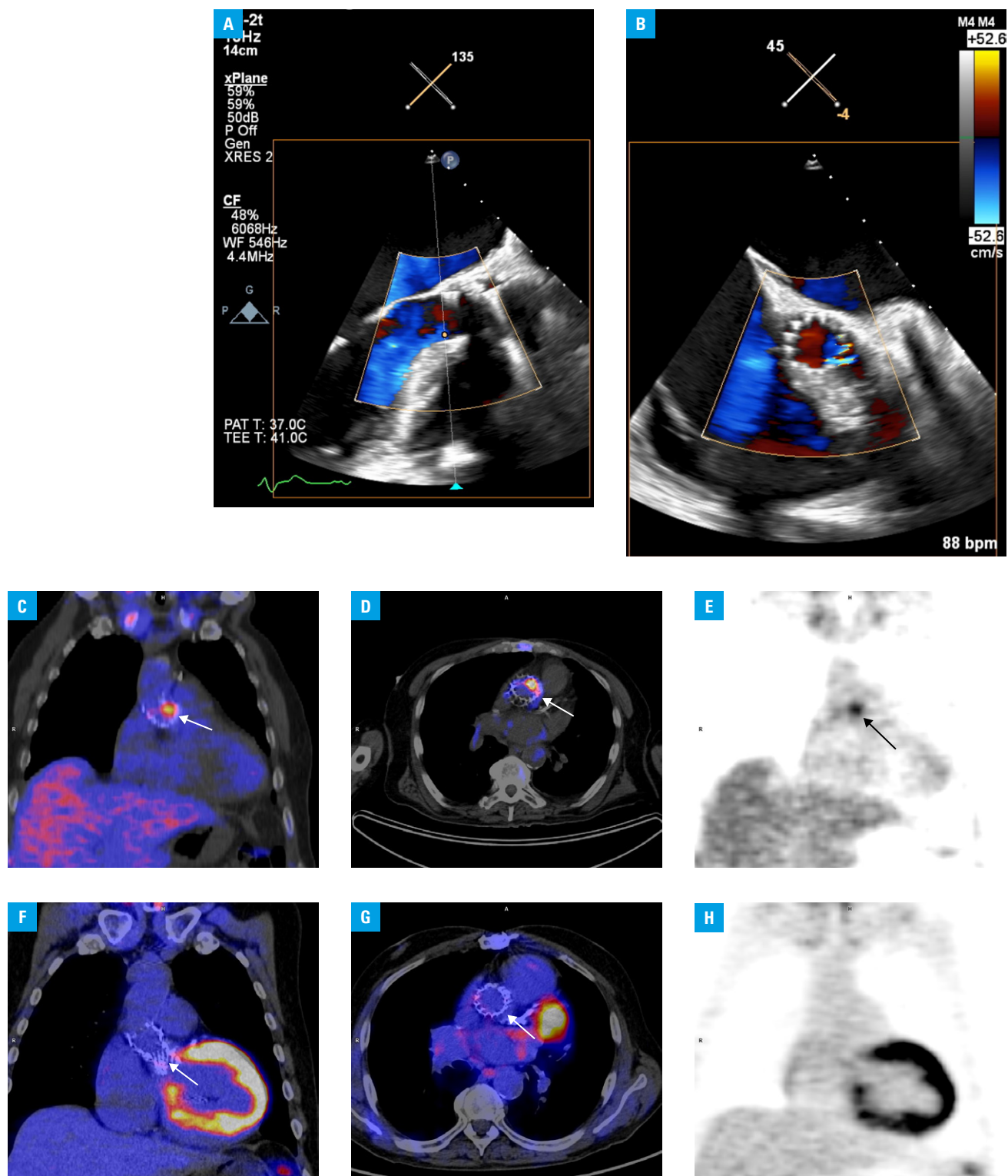


FIGURE 1 **A, B** – transesophageal echocardiography performed 2 days after hospital admission, with no signs of infective endocarditis (IE); **C–E** – fusion images of positron emission tomography/computed tomography (PET/CT) performed in March 2022 for the diagnosis of IE (^{18}F -fluorodeoxyglucose [FDG] PET/CT scan after injection of 326 MBq of ^{18}F -FDG; scan delay, 75 minutes). Arrows indicate the focus of tracer accumulation in the aortic annulus, corresponding to the infection. **E** – standardized uptake value normalized by lean body mass (SUV lbm) for tissues: valve area SUVmax lbm, 3.9; reference (liver) SUVmax lbm, 3.0; **F–H** – fusion images of a follow-up PET/CT performed in August 2022 (^{18}F -FDG PET/CT scan after injection of 266 MBq of ^{18}F -FDG; scan delay, 60 minutes). No signs of increased tracer uptake in the aortic annulus were found (arrows). **H** – SUV lbm for tissues: valve area SUVmax lbm, 2.0; reference (liver) SUVmax lbm, 2.8

the incidence of endocarditis after a valve-in-valve procedure is not yet known, as it is not the standard procedure after IE. Such a scenario has not been described in recent publications. The case presented here demonstrates

that ^{18}F -FDG PET/CT can be a valuable tool in the diagnosis of valve-in-valve endocarditis, as the number of cases of this infection will likely grow due to the increasing availability of percutaneous procedures.

ARTICLE INFORMATION

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