Egyptian Journal of Radiology and Nuclear Medicine

CASE REPORT Open Access

Unexpected septic pulmonary embolism imaging with 18-F FDG PET/CT in an infective endocarditis case: case report

Elife Akgun[1*] and Resit Akyel[2]

Abstract

Background: Infective endocarditis (IE) is a severe disease that is diagnosed using a combination of clinical, microbiologic, and imaging criteria (modified Duke criteria). The prognosis relies on the degree of valvular involvement and crucially the presence of systemic infectious embolism. We present an educational infective endocarditis case with images of 18-F fluoro-D-glucose positron emission tomography/computed tomography (18-F FDG PET/CT) showing hypermetabolic lesions on the prosthetic tricuspid valve and papillary muscle of right ventricle. Besides these lesions, PET/CT showed an unexpected hypermetabolic extra-cardiac focus.

Case presentation: A 36-year-old male patient with IE history was underwent 18-F FDG PET/CT imaging. FDG PET revealed hypermetabolic lesions on the prosthetic tricuspid valve and papillary muscle of right ventricle. Besides these lesions, PET/CT showed an unexpected hypermetabolic focus in the lower lobe of the right lung, which was consistent with septic pulmonary embolism.

Conclusions: 18-F FDG PET/CT is a valuable, noninvasive imaging modality in diagnosis of prosthetic valve IE. It could change treatment planning since detecting extra-cardiac lesions.

Keywords: Infective endocarditis, FDG, PET/CT, Septic embolism, Extra-cardiac

Background

The diagnosis of infective endocarditis (IE) is based on modified Duke criteria. However, it is known that the present criteria have low sensitivity for the diagnosis of prosthetic valve endocarditis. The prognosis of IE is closely associated with the extra-cardiac complications (ECC), embolic events and metastatic infections. ECC incidence was reported as 20–50% [1–3].

Case presentation

A 36-year-old male patient without previous cardiac history presented with fever. Based on laboratory test results and Transthoracic/transesophageal echocardiography (TEE) findings, the patient was diagnosed with native tricuspid valve IE. In this patient, the only risk factor for IE was a tattoo done under non-sterile conditions. The patient had been operated, and a prosthetic valve was implanted. Histopathological examination was consistent with active endocarditis. Staphylococcus epidermidis and Staphylococcus warneri were detected in the microbiological culture. Staphylococcus warneri normally occurs on human skin and is often considered contamination when detected in blood cultures. However, rarely it can cause IE.

One year later, the patient applied to our clinic again with the complaint of fever. A 1.7×0.5 cm hyperechoic, oscillatory mass was revealed by TEE on the septal leaflet of the prosthetic valve. Blood cultures were negative. 18-Fluoro fluoro-D-glucose positron emission tomography/computed tomography (18-F FDG PET/

*Correspondence: elifekaymak@hotmail.com

[1] Department of Nuclear Medicine, Health Sciences University Turkey, Basaksehir Cam and Sakura City Hospital, Istanbul, Turkey
Full list of author information is available at the end of the article

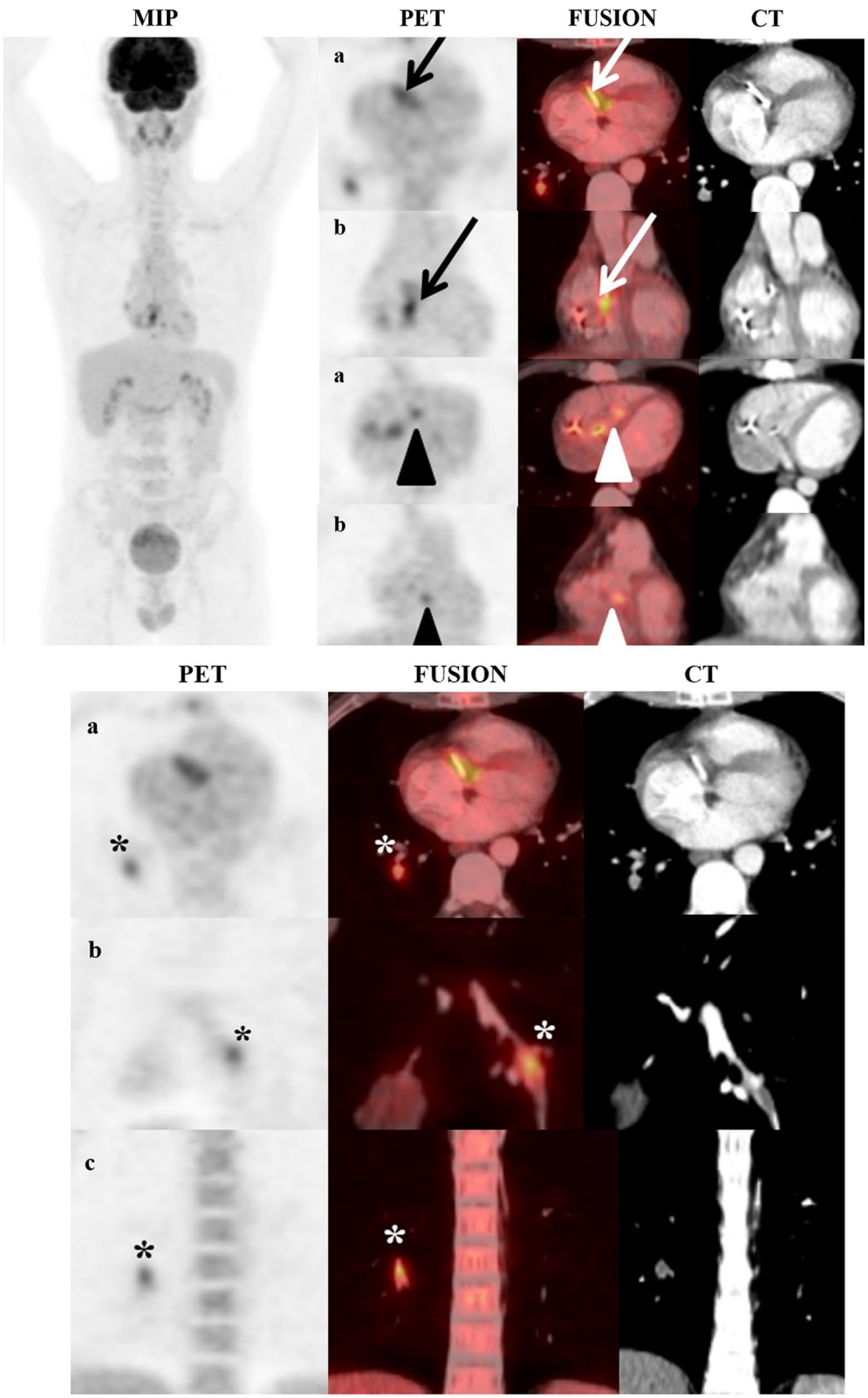

Fig. 1 ^{18}F FDG PET/CT images showing hypermetabolic lesions in the prosthetic tricuspid valve (**arrows**) and papillary muscle of the right ventricle (**arrow heads**). Beside these lesions, PET images revealed a less intensity focal FDG uptake in the pulmonary artery branch of the right lung lower lobe, which was consistent with septic pulmonary emboli (**asterisk**) (**a** axial plane, **b**: coronary plane). MIP: Maximum intensity projection.

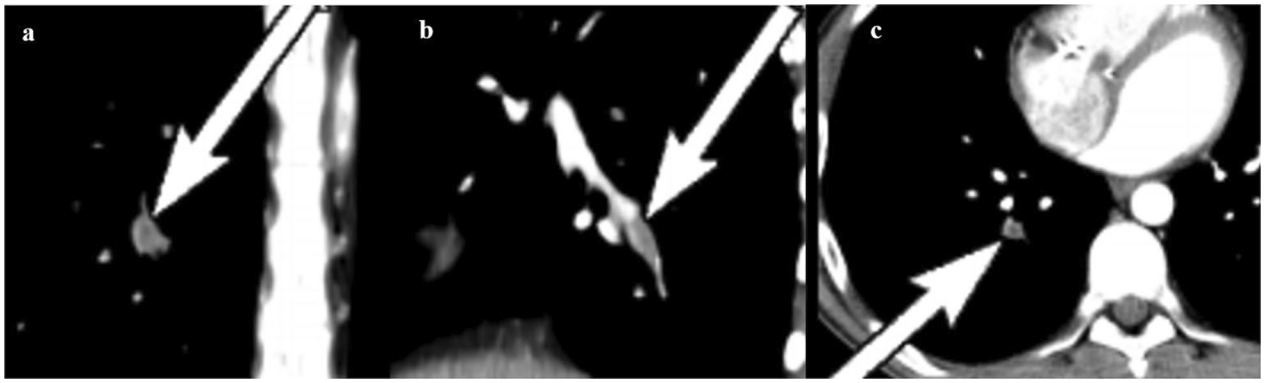

Fig. 2 CT pulmonary angiography revealed filling defects (**arrow**) of pulmonary artery branch supplying right lower lobe, consistent with pulmonary emboli (**a**:sagittal plane, **b**:coronary plane, **c**:axial plane)

CT) scan was planned to confirm prosthetic valve endocarditis. The patient was instructed to maintain a low carbohydrate and fat-rich diet a day before the imaging to suppress physiologic cardiac FDG uptake. The PET/CT scan (Discovery 600, GE Medical Systems, Milwaukee, WI, USA) was performed 60 min after intravenous injection of 4 MBq/kg dose of ^{18}F FDG. During CT examination, 80 mL of contrast agent (Ultravist 300, Schering AG, Berlin, Germany) was administered. Both uncorrected and attenuation-corrected images were assessed in order to identify any artifacts caused by contrast agent, tricuspid valve implant, or cardiac/respiratory motion. PET images revealed hypermetabolic lesions on septal leaflet of tricuspid valve, which was extended to the papillary muscle (Fig. 1). In addition, an unexpected mild hypermetabolic lesion was observed on the pulmonary artery branch of the right lung lower lobe posterobasal segment (Fig. 1 cont.), which was verified as septic embolism in the CT pulmonary angiography (Fig. 2). After reoperation, histopathological and microbiological samples confirmed the diagnosis of Chaetomium globosum infection. The patient was successfully treated with antibiotics, antimycotic and anticoagulation therapy. One month later, control TEE did not show any lesion.

Conclusions

Larger vegetation occurs in cases of right-sided IE due to a delay in diagnosis [4, 5]. Complications in these cases are usually related to embolic events [5]. According to the guidelines, FDG PET/CT may help reduce the number of misdiagnosed IE classified in the "possible" category of the modified Duke criteria and aid in visualizing peripheral embolism and metastatic infective events [6]. Additional extra-cardiac foci detected 17% of patients in PET/CT [7]. Based on the extra-cardiac findings on FDG PET/CT, the incidence of relapsed IE has been reported to be significantly reduced [8]. FDG PET/CT provides promising results in the treatment of patients with IE.

However, it should be kept in mind that peripheral homogeneous radioactivity uptake could be seen at non-infected prosthetic valve which is associated with the physiological scarring process around the prosthesis [9]. This uptake is more obvious on attenuation-corrected PET images. Infected prosthesis should be added to the differential diagnosis when obviously increased uptake of activity with heterogeneous distribution in the periphery of the prosthesis is detected.

In the current case, the FDG PET/CT revealed the undetected lesion by clinical/laboratory findings and other imaging modalities.

Abbreviations

IE: Infective endocarditis; 18-F FDG PET/CT: 18-F Fluoro-D-glucose positron emission tomography/computed tomography; ECC: Extra-cardiac complications; TEE: Transesophageal echocardiography.

Acknowledgements

Not applicable.

Author contributions

The study was designed by EA. Material preparation and data collection were performed by EA and RA. The data analysis was performed by EA. The first draft of the manuscript was written by EA, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding

Not applicable.

Availability of data and materials

Contact the corresponding author for data requests.

Declarations

Ethics approval and consent to participate
This case report was not need ethics committee approval due to retrospective design. All authors certify that the study was performed in accordance with the ethical standards as laid down in the Helsinki declaration as revised in 2013.

Consent for publication
Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Competing interests
The authors declare that they have no competing interests.

Author details
[1]Department of Nuclear Medicine, Health Sciences University Turkey, Basaksehir Cam and Sakura City Hospital, Istanbul, Turkey. [2]Department of Nuclear Medicine, Health Sciences University Turkey, Yedikule Pulmonary Diseases, Thoracic Surgery Education and Research Hospital, Istanbul, Turkey.

Received: 30 June 2022 Accepted: 21 October 2022
Published online: 01 November 2022

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