CLINICAL VIGNETTE

The usefulness of positron emission tomography/computed tomography with 18F-fluorodeoxyglucose in the diagnosis of cardiac device-related infective endocarditis

Anna Kawińska-Hamala[1], Janusz Kawiński[1], Jerzy K. Wranicz[2]

[1]Department of Electrocardiology, Central Teaching Hospital of Lodz, Lodz, Poland
[2]Department of Electrocardiology, Medical University of Lodz, Lodz, Poland

A 67-year-old patient after DDD pacemaker implantation due to complete atrioventricular block (17.04.2014), dislocated right atrial lead (RAL) reposition and pacemaker replacement (05.03.2015), transvenous RAL extraction with implantation of a new lead (03.06.2015), and Lyme disease (1999; IgG+, IgM–) was admitted to hospital due to unexplained subfebrile conditions (≤ 37.2°C), occurring occasionally from 2015, to be diagnosed for possible cardiac device-related infective endocarditis (CDRIE). Three out of 38 blood cultures (BCs) collected from the left hand between 2015 and 2017 were positive for *Staphylococcus Epidermidis*; control BCs from the right hand were negative. No shivering/fever or features of pocket or general infection were observed in previous and current hospitalisations and antibiotic therapy was not used (except perioperative prophylaxis). No additional echoes were observed on transoesophageal echocardiography (TEE), or three previous TEEs (2015–2017). Twelve new control BCs were negative. Positron emission tomography/computed tomography with 18F-fluorodeoxyglucose (18F-FDG PET/CT) revealed no increase in FDG metabolism in the chest. Two locations were identified as potential sources of chronic infection: lingual tonsil/palatine tonsils and left, external iliac lymph nodes (Fig. 1A, B). CDRIE was excluded. The patient was discharged with the recommendation to perform necessary consultations to remove potential infectious foci. This case demonstrates an infection diagnostic process in a patient with a cardiac implantable electronic device (CIED) without a clear final diagnosis, following the 2009 European Society of Cardiology (ESC) guidelines [1] and their modification from 2015 [2]. According to Duke criteria (DC) for infective endocarditis (IE), the patient fulfilled one major (positive BC) and one minor (CIED) criterion, and thus was diagnosed with possible IE [1, 2]. A history of CIED/RAL-related operations and occurrence of subfebrile conditions, although not included in the DC, further increased the risk of CDRIE. Initial elevated C-reactive protein (49.9 mg/L) decreased to normal level. Procalcitonin level and white blood cell count were always within reference range. CDRIE was not confirmed by any of the TEEs. The ESC specifies an IE diagnostic algorithm for patients with CIED. According to class IC recommendation, three BC pairs should be collected [2]. In our patient, three BCs positive for *Staphylococcus Epidermidis* from a total of 50, drawn in large intervals (2015–2017), in individual samples and always from one limb, were considered as contamination (natural skin microorganism) after the microbiologist's consultation. However, coagulase-negative staphylococci may cause IE, so positive samples required verification. Following the guidelines (class IC) [2], TEE was performed and revealed no abnormalities. In such cases, F-FDG PET/CT is recommended (class IIbC) as the next step [2]. PET/CT did not show increased level of FDG metabolism in the chest but indicated other suspected sources of chronic infection. IE diagnostics were completed with negative results. In follow-up no febrile/subfebrile conditions appeared. The patient remains under laryngological and haematological control (currently non-invasive strategy, with tonsillectomy qualification in case of recurrent febrile/subfebrile conditions). PET/CT could reclassify 90% of patients initially diagnosed with possible IE to confirmed (26%) and rejected (64%) [3]. A positive predictive value was 94%, and negative 87% to 88% [3, 4]. PET may detect other locations of potential inflammation (presence of additional hypermetabolic lesions in 28% of cases) [4]. 18F-FDG PET/CT, although currently at the IIbC level of recommendation, has proven to be a diagnostic tool allowing CDRIE exclusion in a difficult case. Additionally, this study indicates other potential sources of chronic infection and emphasises the importance of detailed interview and patient examination before CIED implantation (including laryngological, gynaecological, and dental consultations, chest X-ray, abdominal ultrasonography, and urine test), to identify possible infection sources and facilitate further diagnostics.

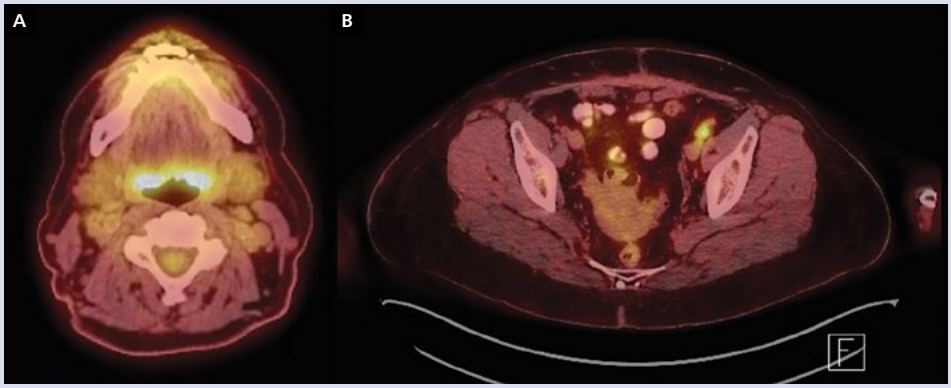

Figure 1. Suspected sources of chronic infection (yellow) in 18F-FDG PET/CT — lingual tonsil, palatine tonsils (**A**), external iliac lymph nodes (**B**)

References

1. Habib G, Hoen B, Tornos P, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis (new version 2009). Kardiol Pol. 2010; 68(supl.1).
2. Habib G, Lancellotti P, Antunes M, et al. 2015 ESC Guidelines for the management of infective endocarditis. Kardiol Pol. 2015; 73(11): 963–1027, doi: 10.5603/kp.2015.0227.
3. Granados U, Fuster D, Pericas JM, et al. Hospital Clinic Endocarditis Study Group. Diagnostic Accuracy of 18F-FDG PET/CT in Infective Endocarditis and Implantable Cardiac Electronic Device Infection: A Cross-Sectional Study. J Nucl Med. 2016; 57(11): 1726–1732, doi: 10.2967/jnumed.116.173690, indexed in Pubmed: 27261514.
4. Tlili G, Amraoui S, Mesguich C, et al. High performances of (18)F-fluorodeoxyglucose PET-CT in cardiac implantable device infections: A study of 40 patients. J Nucl Cardiol. 2015; 22(4): 787–798, doi: 10.1007/s12350-015-0067-x, indexed in Pubmed: 25788402.

Address for correspondence:
Dr. Anna Kawińska-Hamala, Department of Electrocardiology, Central Teaching Hospital of Lodz, ul. Pomorska 251, 92–213 Łódź, Poland, tel: +42 201 43 60, fax: +42 201 43 61, e-mail: anna_kaw@wp.pl

Conflict of interest: *none declared*