Early Diagnosis of Abscess in Aortic Bioprosthesis Valve by 18F-Fluorodeoxyglucose Positron Emission Tomography-Computed Tomography

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Case 1
A 69-year–old woman, with an aortic bioprosthesis valve implanted 2 years before, was referred to our department because of a suspicion of endocarditis. She had experienced fever for 1 week, and Haemophilus parainfluenza was identified in 1 blood culture. The total white blood count (WBC) was $12 \times 10^9$/L, and the erythrocyte sedimentation rate (ESR) was 60 mm. The first transthoracic and transesophageal echocardiographic (TEE) studies were considered as normal. However, the 18F-fluorodeoxyglucose positron emission tomography-computed tomography (18F-FDG PET-CT), performed the day after, revealed an intense fixation at the level of the bioprosthesis valve. Then, a treatment with ceftriaxone and gentamicin was started. Six days later, although fever persisted and ESR remained elevated, a second TEE showed the emergence of a periprosthetic abscess without any dehiscence (Figure 1 and Movies I and II). The lesions were confirmed during surgery performed thereafter.

Case 2
A 68-year–old man, with a history of aortic bioprosthesis valve implanted 4 years before and a malignant lymphoma of the skin, was referred to our department because of a suspicion of endocarditis. He had experienced recurrent fever for 1 month associated with many methicillin sensible Staphylococcus aureus-positive blood cultures. The WBC was $3.2 \times 10^9$/L, and the ESR was 105 mm. A treatment with vancomycin (allergy to penicillin) and gentamicin was started, and the first transthoracic echocardiographic study and TEE (day 1) were considered as normal. However, the 18F-FDG PET-CT, performed at day 4, revealed an intense fixation at the level of the bioprosthesis valve. Then, a treatment with ceftriaxone and gentamicin was started. Six days later, although fever persisted and ESR remained elevated, a second TEE showed the emergence of a periprosthetic abscess without any dehiscence (Figure 1 and Movies I and II). The lesions were confirmed during surgery performed thereafter.

Case 3
A 69-year–old woman, with an aortic bioprosthesis valve implanted 3 years before, was referred to our department because of a suspicion of endocarditis. She had experienced recurrent fever for 4 months associated with negative blood cultures and negative serologies for Coxiella burnetii, Bartonella sp., Mycoplasma sp., Legionella sp., Aspergillus sp., and Brucella sp. The WBC was $8.3 \times 10^9$/L and the ESR was 61 mm. Several TEE and transthoracic echocardiographic studies remained doubtful, with a thickening of the periprosthetic tissue. Under amoxicillin plus gentamicin, and 2 days after the last TEE, the 18F-FDG PET-CT revealed an intense fixation at the level of the bioprosthesis valve. Four days after (day 6), although the WBC and ESR did not change, the patient experienced a transient ischemic attack, and a periprosthetic abscess without dehiscence was identified by a new TEE (Figure 3 and Movies V and VI). The patient underwent an urgent valve surgery, which confirmed the lesions. No microorganism could be identified on the explanted tissue culture.

Discussion
The diagnosis of endocarditis usually relies on the association of an infectious syndrome and an endocardial involvement. Echocardiography remains an accurate tool to detect endocardial lesions (vegetation, abscess, perforation, etc) and must be performed rapidly and repeated once a week as soon as infective endocarditis is suspected. However, the results provided by this technique can be normal or doubtful, especially in case of prosthetic valve or other intracardiac devices. Therefore, innovations in the field of diagnostic strategy have emerged to resolve these issues through new...
imaging techniques. Our 3 cases illustrate the potential role of the 18F-FDG PET-CT in the early diagnosis of the difficult situation of prosthetic valve endocarditis. In each cases, the first echocardiographic examinations were considered as normal or doubtful, whereas 18F-FDG TEP-CT was normal. These cases are particularly relevant because the echocardiographic signs appeared later in the course of the disease, which suggests a higher sensitivity of 18F-FDG PET-CT over echocardiography in this setting. Some preliminary studies have shown that 18F-FDG PET-CT could be useful in the detection of endocarditis-related silent peripheral embolic events and in the diagnosis of pacemaker lead infections. Nevertheless, the ultimate use for this technique in the setting of native and prosthetic valve endocarditis has yet to be defined.

Figure 1. Results of echocardiographic studies and 18F-fluorodeoxyglucose positron emission tomography-computed tomography (18F-FDG PET-CT) in case 1. The first transesophageal echocardiography (A) did not show any abnormalities around the aortic bioprosthetic annulus (white arrow). The second transesophageal echocardiography (B), performed 6 days after, showed a small periprosthetic abscess (red arrow). The 18F-FDG PET-CT performed the day after the first echocardiography showed a hyperfixation around the aortic prosthesis (C, blue arrow).

Disclosures
None.

References
Figure 2. Results of echocardiographic studies and 18F-fluorodeoxyglucose positron emission tomography-computed tomography (18F-FDG PET-CT) in Case 2. The first transesophageal echocardiography (A) did not show any abnormalities around the aortic bioprosthetic annulus (white arrow). The second transesophageal echocardiography (B), performed at the end of antibiotic treatment (1 month later), showed a large periprosthetic abscess (red arrow). The 18F-FDG PET-CT performed 3 days after the first echocardiography showed a hyperfixation around the aortic prosthesis (C, blue arrow).
Figure 3. Results of echocardiographic studies and 18F-fluorodeoxyglucose positron emission tomography-computed tomography (18F-FDG PET-CT) in Case 3. The first transesophageal echocardiography (A) showed a small thickening around the aortic bioprosthetic annulus (white arrow). The second transesophageal echocardiography (B), performed 8 days after, showed a periprosthetic abscess (red arrow). The 18F-FDG PET-CT performed the day after the first echocardiography showed a hyperfixation around the aortic prosthesis (C, blue arrow).
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