Case report - Vascular general

Comparison of detection of F-18 fluorodeoxyglucose positron emission tomography and $^{99m}$Tc-hexamethylpropylene amine oxime labelled leukocyte scintigraphy for an aortic graft infection

Emmanuel Gardet*, Rамиs Addas*, Jacques Monteil*, Alexandre Le Guyader*

*Department of Thoracic and Cardiovascular Surgery, Dupuytren University Hospital, University of Limoges, 87042 Limoges, France
*Department of Nuclear Medicine, Dupuytren University Hospital, University of Limoges, 87042 Limoges, France

Received 15 July 2009; received in revised form 14 September 2009; accepted 28 September 2009

Abstract

To compare F-18 fluorodeoxyglucose positron emission tomography (F-18 FDG-PET) and $^{99m}$Tc-hexamethylpropylene amine oxime ($^{99m}$Tc-HMPAO) labelled leukocyte scintigraphy for the diagnosis of vascular graft infection. A thoraco-abdominal CT-angiography and a $^{99m}$Tc-HMPAO labelled leukocyte scintigraphy did not show any graft infection in this case report whereas an F-18 FDG-PET showed a metabolic uptake around and all along the vascular graft. Further comparison between these two explorations is needed since the two techniques have not been compared in vascular graft infection.

© 2010 Published by European Association for Cardio-Thoracic Surgery. All rights reserved.

Keywords: Vascular graft infection; CT-scan; $^{99m}$Tc-HMPAO labelled leukocyte scintigraphy; F-18 FDG-PET

1. Case report

A 47-year-old male patient, with a known Behcet syndrome for 10 years, underwent an aorto-bifemoral graft procedure for an infrarenal abdominal aortic aneurysm. Five years later, the patient was operated again for a thrombosed prosthesis and underwent an axillofemoral bypass which further thrombosed two years later. Finally, after he had been redirected to our department, a new bypass was performed between the thoracic descending aorta and both femoral arteries.

Six months later two superficial abcesses appeared on the femoral triangle together with a biological septic syndrome (CRP = 110 mg/l; Leukocytes = 14,000 Giga/l). These abcesses were superficial with no obvious clinical fistula or exposure of the prosthesis. However, graft infection was suspected. Firstly, a thoraco-abdominal computed tomography (CT)-angiography was performed but did not show any periprosthetic gas or fluid collection (Fig. 1). Therefore, a $^{99m}$Tc-hexamethylpropylene amine oxime ($^{99m}$Tc-HMPAO) labelled leukocyte scintigraphy was done which did not show any pathological leukocyte uptake except (Fig. 2a). This unexpected result led to perform an F-18 fluorodeoxyglucose positron emission tomography (F-18 FDG-PET). Finally, this exam showed a metabolic uptake around and all along the vascular graft (Fig. 2b). All of the prosthesis was removed by thoracolaparotomy and was replaced with a silver aorto-bifemoral graft. Bacteriological tests revealed the presence of Staphylococcus aureus. One month after surgery, the patient was healthy and not infected (CRP = 11 mg/l; Leukocytes = 8300 Giga/l).

2. Discussion

Aortic reconstructive surgery with prosthetic graft is commonly used to treat abdominal aortic aneurysm. Although the complication rate is low (2–6% of patients), graft infection is life threatening. In this clinical setting, successful management requires a prompt and accurate diagnosis and surgical intervention. The diagnosis of graft infection is easy when there are local symptoms such as a superficial abscess associated with either prosthesis exposure or a fistula on the femoral triangle. On the contrary, the diagnosis remains more difficult when the infection is suspected in the retroperitoneal area. Radiology plays a critical role in diagnosing occult infection and in determining the extent of known infections. In a first stage, CT-scan has a good sensitivity (94%) and specificity (85%) to detect complications of graft infections such as perigraft fluid collection or ectopic gas [1]. When CT-scan results are negative, as in our case or in low-grade infection, leukocyte scintigraphy can be done in second stage.

$^{99m}$Tc-HMPAO labelled leukocyte scintigraphy has been considered as the gold standard for the diagnosis of prosthesis infections. However, false negatives as in our case...
can be described. Explanations for false negatives could be the delay between this technique and the prosthesis infection, or by the use of antibiotics prior to the leukocyte scintigraphy, although it is not described in the literature. However, the number of false positives (36%) can be reduced by using a combination of techniques such as, FDG-PET and CT [2]. Compared with conventional scintigraphy, FDG-PET seems to be a promising technical method for infection diagnosis and can be used in a second stage when CT-scan results are negative. Lauwers et al. found a sensitivity of 93% and a specificity of 91% for vascular prosthesis graft infection [3]. It is also considered to have other advantages such as faster acquisition and better spacial resolution. However, one has to remember to perform an FDG-PET at least two months after surgery when the healing and inflammatory processes are over.

To our knowledge, leukocyte scintigraphy and FDG-PET have not yet been compared in vascular graft infection. Only one study available in the literature compares the two nuclear techniques in a joint prosthesis case report [4]. PET was found to be less accurate than $^{99m}$TC-HMPAO labelled leukocyte scintigraphy. Therefore, further comparisons between these two nuclear techniques are needed with a greater number of patients. It cannot be stated which technique has to be used first if a CT-scan is negative, but we suggest performing both a leukocyte scintigraphy and an FDG-PET in this situation, depending on the delay after surgery.

Acknowledgement

We are grateful to Sylvie Gautier (Laboratory of Applied English, Université de Limoges) for her linguistic reviewing of this manuscript.

References