Positron emission tomography with ^{18}F-fluorodeoxyglucose in patients with uterine sarcoma

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Abstract. — *Objective.* To describe our experience with 18F-fluorodeoxyglucose positron emission tomography (FDG-PET), in patients with uterine sarcomas, both under suspicion of recurrence and in tumour staging as an incidental pathology finding after hysterectomy.

Material and methods. A retrospective review of FDG-PET performed in 10 patients with clinical diagnosis of uterine sarcoma (7 patients with suspicion of recurrence and three for initial staging) was carried out between April 2002 and January 2006. Mean age was 52.2 years. The time of evolution after initial diagnosis varied from one month to 15 years (median time: 14 months). Lesions were classified as 8 leiomyosarcomas and 2 carcinosarcomas. FIGO staging classified 5 patients as stage I, 1 patient as stage III, and 4 patients as stage IV.

Results. In 4 of 7 patients with suspicion of recurrence, there were discrepancies between the information provided by positron emission tomography (PET) and conventional imaging techniques (CIT). FDG-PET was negative in three cases of inconclusive CAT. PET was negative in one case with pulmonary metastases. There was concordance between the FDG-PET and CIT findings in the 3 staging studies. Pathological confirmation was obtained in 5 cases, with a mean follow-up time of 14 months.

Conclusions. FDG-PET may be useful in the follow up of uterine sarcoma patients and when the tumour is an incidental finding in hysterectomy for other causes.

KEY WORDS: FDG-PET, uterine sarcoma, uterine cancer, staging, recurrence, follow up.

TOMOGRAFÍA POR EMISIÓN DE POSITRONES CON ^{18}F-FLUORDESOXIGLUCOSA EN PACIENTES CON SARCOMA UTERINO

Resumen.— *Objetivo.* Describir nuestra experiencia con la tomografía por emisión de positrones con FDG-PET en pacientes con sarcoma uterino, tanto con sospecha de recurrencia como en estadificación tumoral tras hallazgo casual en la pieza de histerectomía.

Material y métodos. Se revisaron retrospectivamente (abril 2002-enero 2006) los estudios de FDG-PET realizados a 10 pacientes diagnosticadas de sarcoma uterino, 7 por sospecha de recurrencia y 3 por estudio de extensión. La edad media fue de 52,2 años. El tiempo de evolución desde el diagnóstico inicial oscilaba entre 1 mes y 15 años (mediana: 14 meses). Histológicamente, las lesiones correspondieron a 8 leiomiosarcomas y 2 carcinosarcomas. La estadificación según la clasificación FIGO de las pacientes fue: 5 casos en estadio I, 1 en estadio III y 4 en estadio IV.

Resultados. En 4 de las 7 pacientes con sospecha de recurrencia existió discrepancia entre la información proporcionada por la tomografía por emisión de positrones (PET) y las técnicas de imagen convencionales. En tres casos de tomografía axial computarizada no concluyente la FDG-PET fue negativa y las pacientes no presentaron evidencia de enfermedad. La PET resultó negativa en una paciente con metástasis pulmonares. En los 3 estudios de estadificación hubo concordancia entre los hallazgos de la FDG-PET y las técnicas de imagen convencionales. Existió confirmación histológica de las lesiones en 5 pacientes, con un seguimiento medio de 14 meses.

Conclusión. La FDG-PET puede ser útil en el seguimiento de las pacientes con sarcoma uterino y cuando el tumor es un hallazgo casual en una histerectomía por otras causas.

PALABRAS CLAVE: FDG-PET, sarcoma uterino, cáncer de cuerpo de útero, estadificación, recurrencia, seguimiento.

INTRODUCTION

Uterine sarcoma is an uncommon, very aggressive malignant tumour which constitutes less than 5% of all malignant neoplasia of the uterine corpus, and as a whole represents 1-2% of malignant gynaecological tumours. The most common histological types are leiomyosarcomas, mixed mesodermal tumours and endometrial stroma sarcomas. The mean age of patients at diagnosis is 60 years and the clinical presentation is usually quite non-specific. The

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diagnostic techniques do not usually provide definitive data, and in up to 50% of cases, the diagnosis is made on the anatomicopathological study of the surgical specimen. The treatment of choice is surgery, while the role of adjuvant radiotherapy and/or chemotherapy is more controversial.[1, 2]

In recent years there has been increasing interest in the role of positron emission tomography (PET) with 2-[^{18}F]fluoro-2-deoxy-D-glucose (^{18}FDG) (FDG-PET) in the management of patients with gynaecological neoplasia, but its clinical application is still very limited.[3-13] The use of FDG-PET in the clinical management of patients with uterine sarcomas has been examined in few studies. In the literature, Umesaki et al,[14] in a series of cases, described the effectiveness of FDG-PET in the diagnosis of uterine sarcomas with magnetic resonance (MR) and Doppler ultrasound, and recently, Murakami et al,[15] in a prospective study, evaluated the utility of FDG-PET for the detection of recurrence in the follow-up of patients with uterine sarcomas.

The usefulness of PET in the clinical management of patients with uterine sarcomas has also been described in isolated clinical cases. Thus, Jadvar and Fischman[16] presented the first case of abdominal recurrence of a uterine leiomyosarcoma detected on an FDG-PET. Umesaki et al[17] related the preoperative diagnosis of a uterine leiomyosarcoma with the combined use of MR and FDG-PET. Finally, Chander and Ergun[18] described a case of uterine sarcoma diagnosed with PET and computerised axial tomography (CAT) and its usefulness in differentiating between benign and malignant lesions.

Below, we describe our experience with FDG-PET in patients with uterine sarcomas, both with suspicion of recurrence and in tumour staging after incidental finding in the hysterectomy specimen.

MATERIAL AND METHODS

A retrospective observational study was carried out, reviewing the FDG-PET studies practiced between April 2002 and January 2006 on 10 patients diagnosed with uterine sarcoma after surgery. In addition, 7 cases had received chemotherapy and 6 external radiotherapy. In 7 of the patients, the reason for requesting the examination was suspicion of tumour recurrence and in 3 was tumour staging, since the tumour was an incidental finding in the anatomopathological study of the hysterectomy specimen.

The patients had a mean age of 52.2 years (range: 33-70 years). In patients with suspicion of recurrence, the time of evolution from initial diagnosis varied between 1 month and 15 years (median: 14 months), and in the cases for staging between 1 and 3 months. Histologically, the primary lesions corresponded to 8 leiomyosarcomas and 2 mixed mesodermal tumours (carcinosarcomas). At the time of initial diagnosis of patients with suspicion of recurrence, 4 cases were at stage 1 and 3 at stage IV, according to the classification of the International Federation of Gynecology and Obstetrics (FIGO).[19] The 3 patients in tumour staging were classified as stages I, III and IV, respectively.

A dedicated tomograph, Siemens model ECAT-EXACT 47 (Siemens-CTI, Knoxville, Tennessee, U.S.), was used to carry out the PET studies. Preparation prior to the examination required a 6 hour fast and blood glucose less than 120 mg/dl. In addition, a muscle relaxant (diazepam 5-10 mg orally) was administered to all the patients 30 minutes before injection of the radiopharmaceutical agent, and bladder catheterization was performed. Image acquisition was between 45 and 60 minutes after the administration of tracer. The dose administered was 210-370 MBq of ^{18}FDG, intravenously. The acquisition protocol consisted of a body study from the base of the cranium to the upper third of the lower limbs, with emission images (5 minutes) and transmission images (3 minutes) in 2D mode. The data obtained were acquired on a 128 x 128 matrix.

Processing and reconstruction of the images was carried out using an iterative method, OSEM (ordered subset expectation maximization), 2 iterations and 8 subsets, on a SUN work station (SUN Microsystems, Mountain View, California, U.S.). Attenuation correction of the emission images was made with transmission data from an external ^{68}Ge source. Qualitative analysis of the images obtained in the three space planes (coronal, sagittal and transversal) was performed. Those studies which showed ^{18}FDG uptakes which were not explained by physiological processes were