

Original article

Clinical Relevance of Incidental Finding of Focal Uptakes in the Colon during ¹⁸F-FDG PET/CT Studies in Oncology Patients without Known Colorectal Carcinoma and Evaluation of the Impact on Management[☆]

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ARTICLE INFO

Article history:

Received 11 February 2011

Accepted 21 March 2011

Keywords:

¹⁸F-FDG PET-CT

Colorectal cancer

Incidental lesions in colon

Incidental findings

ABSTRACT

Aims: To assess the significance and the impact of focal FDG uptake in the colon in oncology patients without known colorectal carcinoma.

Materials and methods: A retrospective study was undertaken on 2220 ¹⁸F-FDG PET/CT studies carried out consecutively in the Nuclear Medicine Department in our hospital from 2 December 2008 to 31 May 2010. Inclusion criteria were patients with abnormal ¹⁸F-FDG uptake in colorectal area that could not be explained (or not previously known) by their clinical histories. Patients previously diagnosed with colorectal carcinoma were excluded. A total of 86 patients (57 male, average age 63.4, range 46–85) were finally included. Colonoscopy with biopsy was established as a reference test. The impact of these findings on the diagnostic–therapeutic management in these patients was evaluated.

Results: A colonoscopy was performed in 54 of the 86 patients, this examination not having been done up-to-date in the remaining 32 patients. Biopsy was obtained in 43 lesions of the 54 patients in whom a colonoscopy was performed. Colon disease was detected in 49 of these 54 patients, obtaining 54 FDG incidental foci which corresponded to 10 previously unsuspected primary colorectal carcinoma, 3 metastases, 27 adenomatous polyps with different degrees of dysplasia and 14 inflammatory processes. In the remaining 5 patients, the colonoscopy was normal. PET/CT modified the diagnostic and treatment management in most of the patients (49/54, that is 91%).

Conclusions: These results confirm the need to determine the cause of abnormal ¹⁸F-FDG colorectal uptakes in the PET/CT studies by using colonoscopy and biopsy. This approach allows for the detection and early treatment of malignant and premalignant lesions.

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Significación de captaciones incidentales en colon en estudios ¹⁸F-FDG PET-TAC en pacientes sin tumor colorrectal conocido. Valoración del impacto en el manejo del paciente

RESUMEN

Objetivos: Valorar la significación y el impacto de acumulaciones de FDG en el colon en pacientes con tumores no colorrectales.

Material y métodos: Se revisaron retrospectivamente 2.220 estudios PET-TAC realizados de manera consecutiva en el Servicio de Medicina Nuclear de nuestro hospital del 2 de diciembre de 2008 al 31 de mayo de 2010. Se incluyeron aquellos pacientes en los que se describían captaciones focales de FDG a nivel colorrectal y no explicables por la historia clínica. Se excluyeron pacientes diagnosticados previamente de carcinoma colorrectal. Cumplieron el criterio de inclusión 86 pacientes (57 hombres, media de edad de 63,4 años, rango 46-85). Se estableció como prueba de referencia la colonoscopia con toma de biopsia. Se valoró el impacto de estos hallazgos en la actitud diagnóstico-terapéutica de estos pacientes.

Resultados: En 54 de los 86 pacientes se realizó correlación colonoscópica, en los 32 restantes no se había realizado dicha exploración hasta la fecha. De los 54 en los que se realizó colonoscopia se tomó biopsia en 43 lesiones. Se detectó patología colónica en 49 pacientes, con un total de 54 focos incidentales de FDG, siendo estas patologías: 10 cánceres colorrectales primarios insospechados, tres metástasis, 27 pólipos adenomatosos con diferentes grados de displasia y 14 procesos inflamatorios. En los 5 pacientes restantes la colonoscopia fue normal (9%). La PET-TAC modificó la actitud diagnóstico-terapéutica en la mayoría de pacientes (49/54, 91%).

Palabras clave:

¹⁸F-FDG PET-TAC

Cáncer colorrectal

Lesiones incidentales en colon

Hallazgos incidentales

[☆] Please, cite this article as: Salazar Andía G, et al. Significación de captaciones incidentales en colon en estudios ¹⁸F-FDG PET-TAC en pacientes sin tumor colorrectal conocido. Valoración del impacto en el manejo del paciente. Rev Esp Med Nucl. Rev Esp Med Nucl. 2012;31(1):15-21.

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Conclusiones: Estos resultados constatan la necesidad de confirmar mediante colonoscopia y biopsia las captaciones focales colorrectales de FDG en PET-TAC. Esta estrategia permite detectar y tratar precozmente lesiones malignas y premalignas.

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Introduction

Colorectal carcinoma (CRC) is one of the most frequent neoplasms in Western countries. In Spain, it is the third cause of cancer in men, behind prostate and lung cancer, and the second cause in women after breast cancer. It is estimated that around 22,000 new cases of CRC are diagnosed every year in Spain, and almost 50% of the patients affected die from the disease.^{1,2} The etiopathogenesis is multifactorial. Several mechanisms have been described that participate in the development and progression of CRC. These range from diverse genetic or molecular factors involved in the pathophysiology of this neoplasm to a variety of epidemiological factors involved in its genesis. In particular, the identification of the genes that cause hereditary forms of CRC and the demonstration of the premalignant potential of the colorectal adenoma have originated various preventive strategies, which can certainly contribute to diminishing the incidence and morbimortality of CRC.^{3–5}

Positron emission tomography (PET-CT) with ¹⁸F-fluorodeoxyglucose (FDG) is an imaging technique used in the initial diagnosis, staging, restaging and monitoring of the response to treatment in oncologic patients.^{6–8} This technique is recognized as a useful tool in the control of CRC and has been shown to have added value in the detection of disease recurrences.^{9,10} Previous studies have indicated that incidental colorectal deposits of FDG are associated with a considerable risk of underlying neoplasm. Therefore, the early identification of these hidden lesions can have an important impact on the clinical and therapeutic management of patients.^{11–13} The aim of our study was to assess the significance and impact of incidental FDG uptake by the colon in PET-CT scans of patients with non-colorectal tumors, in addition to determining whether the location of FDG foci on PET-CT scans is consistent with the location of the lesions observed in colonoscopy.

Material and method

Patients

An observational study was made of a series of clinical cases using data collected retrospectively. A review was made of 2220 consecutive PET-CT scans made in the nuclear medicine department of San Carlos University Hospital from 2 December 2008 to 31 May 2010. We screened for patients with PET-CT reports showing focal, segmental or multifocal colorectal FDG uptake and reached conclusions that indicated the possibility of a malignant or premalignant lesion and recommended colonoscopy. All patients with a known history of colorectal cancer and/or known benign colonic pathology were excluded from the study (intestinal inflammatory disease, diverticulosis, hemorrhoids, etc.). Eighty-six patients fulfilled the inclusion criteria: 57 men and 29 women, mean age 63.4 years (range: 46–85 years). The diagnoses of these patients at the beginning of the test were: malignant melanoma (2), digestive tumors other than colonic tumors (13), gynecologic tumors (9), lymphoma (9), tumor of unknown origin (TUO) (11), head and neck tumors (11), lung carcinoma (21), solitary pulmonary nodule (SPN) (9) and sarcoma (1).

¹⁸F-FDG PET-CT protocol

Our unit has a Siemens Biograph, True View PET-TC scanner that integrates a 6-detector CT with a late-generation PET using LSO crystals.

On the day of the examination, prior to the study acquisition, an interview was conducted with the patients to obtain informed consent in writing for the administration of intravenous iodide contrast. In cases of non-contrast enhanced CT (because a recent contrast-enhanced CT is available, low-dose CT is planned or contrast administration is contraindicated), verbal consent alone was sufficient.

Fasting for at least 4 h was required. Blood glucose level was determined in all the patients, and if it was lower than 180 mg/dl, ¹⁸F-FDG (10–15 mCi) was administered intravenously about 45 min before the test. If the blood glucose was above 180 mg/ml, rapid insulin was given subcutaneously. Insulin can make it difficult to evaluate muscular radiopharmaceutical uptake images. During this period of time, patients must rest and, if indicated, drink oral contrast (1000 ml of gastrografin 370 mg iodine/ml). CT scan was performed first and then PET scan.

Both CT and PET scans were performed from the base of the skull to the root of the thigh, except in patients with suspected cerebral metastasis, in which the skull was also included. The CT scan parameters were: kVp/effective mAs/rotation: 110/95/0.5; slice thickness: 5 mm; reconstruction interval: 3 mm; and pitch: 1.5. When a diagnostic CT (“high dose”) of the patient had been made recently, “low dose” CT was obtained by reducing the milliamperes for the height and weight of the patient. The CARE Dose4D automatic exposure control system was used to determine the most suitable product level for each section of the patient from a personalized topogram.

The intravenous contrast was administered if not contraindicated (allergic history, renal insufficiency), except for patients with a recent CT scan in the Department of Radiology and a previous PET-CT in which metabolic response to treatment (for example, response to treatment in lymphoma) was evaluated. A dual lumen pump was used (Ulrich Medizintechnik, Missouri). Oral contrast was used in patients with suspected abdominal disease. The contrast CT scan is used for attenuation correction.

In patients with suspected pulmonary pathology and no recent CT scan of the thorax, an additional low dose (40 mAs) thoracic CT scan in inspiration was made because the standard CT scan of the PET-CT study is made in continued breathing.

In patients with neck tumors and no recent imaging studies, a PET-CT scan was made of the cervical region, with the patient correctly positioned and optimal CT parameters, after injecting 50 ml of intravenous contrast.

PET acquisition was done with the patient breathing smoothly and regularly. Five or six bed positions were obtained, depending on the height of the patient. The PET acquisition time was 3 min per bed position.

Image analysis and interpretation

A visual analysis was made of the images and a semiquantitative evaluation of the regions of interest with measurement of the Standardized Uptake Value. All studies were assessed independently by a physician specialized in nuclear medicine and PET scans and by another physician specialized in radiodiagnostics, who were

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