

ARTICLE

Supra-clavicular lymph node metastatic spread in patients with ovarian cancer disclosed at ^{18}F -FDG-PET/CT: an unusual finding

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Abstract

Tumoral dissemination of ovarian cancer most commonly occurs through the intra-peritoneal route; nevertheless, although it is rare, ovarian cancer may also metastasise through the lymphatic channels. Lymphatic diffusion of ovarian cancer usually involves pelvic and retro-peritoneal lymph nodes. Extra-abdominal lymph nodes are rarely involved and their detection may represent a challenge for the oncologist. We describe here two patients studied for ovarian cancer by [^{18}F]fluoro-2-deoxy-D-glucose (^{18}F -FDG) positron emission tomography (PET)/computed tomography (CT): one case during pre-operative staging, the other for restaging after surgery. In both cases PET examination identified extra-abdominal lymph node tumoral spread in the left supra-clavicular space; biopsy led to a final diagnosis of recurrent ovarian cancer. Previous reports in the literature on tumoral spread of ovarian cancer to the supra-clavicular nodes are rare, however this possible site of metastatic involvement has to be kept in mind by oncologists and our data show that the ^{18}F -FDG PET/CT may be useful to disclose this unusual supra-diaphragmatic lymphatic diffusion of metastatic lymphatic ovarian cancer.

Keywords: ^{18}F -FDG PET/CT; ovarian cancer; disease recurrence; supra-clavicular lymph nodes.

Introduction

Ovarian cancer has the highest mortality rate of all gynaecologic malignancies in Europe and in the United States^[1]. This happens primarily because ovarian cancer presents at a relatively advanced stage of the disease.

Dissemination of ovarian cancer is most common by the intra-peritoneal route so that in the majority of patients disease most frequently remains confined to the peritoneal cavity^[2]. Nevertheless, ovarian cancer may also metastasize through lymphatic channels; for this reason a lymph node metastasis classification has been introduced into the FIGO staging.

The prognostic significance of lymph node metastasis(es) in ovarian cancer is still controversial^[3] and researchers have paid most attention to investigating the prognostic impact of para-aortic lymph node metastasis^[4]. Indeed, very few papers describe extra-abdominal lymph node involvement in this type of tumour^[5,6].

Positron emission tomography (PET) with [^{18}F]fluoro-2-deoxy-D-glucose (FDG) has emerged as an extremely useful technique in clinical oncology. A high accuracy of ^{18}F -FDG PET has been proven for evaluating patients with ovarian tumours, both for the assessment of ovarian neoplasms before treatment and for the evaluation of cancer recurrence^[7,8].

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Figure 1 ^{18}F -FDG PET/CT scan showing multiple sites of increased FDG uptake in abdominal lymph nodes but also in the left supra-clavicular region.

Recently hybrid PET/computed tomography (CT) has been introduced in clinical practice, combining the information derived from the functional imaging of ^{18}F -FDG PET with the detailed morphological data of CT. Preliminary reports indicate a potential usefulness of this technique for the precise identification of cancer spread^[9]. In particular, in ovarian cancer ^{18}F -FDG PET/CT was found to be particularly useful in identifying abdominal recurrence^[10].

We describe here two patients studied for ovarian cancer. In both cases ^{18}F -FDG PET/CT allowed us to identify extra-abdominal lymph node involvement in the left supra-clavicular space.

Materials and methods

PET technique

Each patient, fasted for at least 6 h, was intravenously injected with 5.3 MBq/kg of ^{18}F -FDG; images were recorded 60–90 min after tracer administration using a Discovery LS-ST4 scanner (General Electric Medical System, Waukesha, WI). The CT parameters were as follows: 140 kV, 90 mA, 0.8 s per tube rotation, 30 mm table speed per gantry rotation. Multi-slice technology allowed the acquisition of four slices per tube rotation

with a thickness of 5 mm. PET studies were performed acquiring 4 min of emission data per bed position and 35 transaxial images were reconstructed for each bed. Scaled CT images were used for non-uniform attenuation correction of PET emission scans. Total scan time was approximately 20 min.

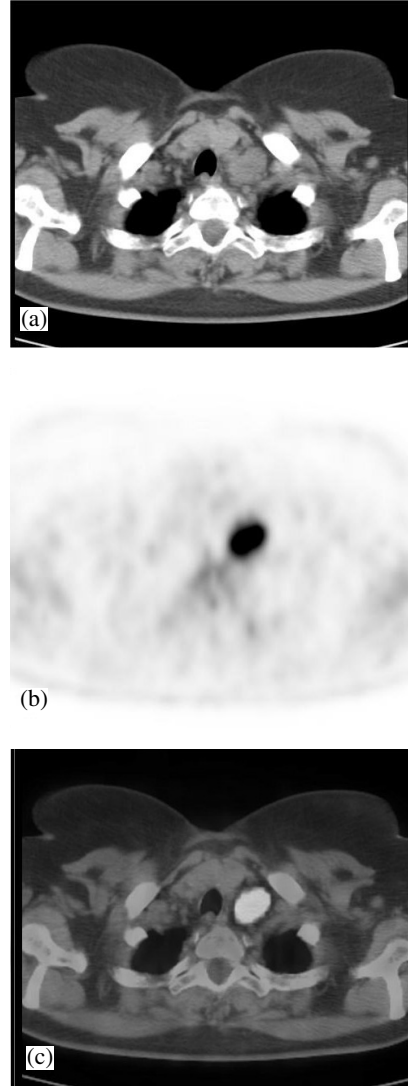


Figure 2 ^{18}F -FDG PET/CT scan: (a) CT image, (b) PET image, (c) fusion PET/CT image. Focal area of highly increased FDG uptake is shown in the left supra-clavicular lymph nodes.

Case report 1

A 51-year-old patient was operated on June 2003 for a pelvic tumour. Pre-surgical diagnostic work-up included abdominal-pelvic CT and ultrasound; a large pelvic mass likely originating from the left ovary was depicted. At laparoscopy a 10 cm mass characterised by a combination of solid and cystic areas with involvement of both annexials was found. The patient was operated on by laparotomy, and total hysterectomy plus

bilateral annexial resection and peritoneal washing were performed. Histology indicated a poorly differentiated cancer, infiltrating the myometrium; the peritoneal fluid was positive for cancerous cells. The patient was then scheduled for chemotherapy. Before an ^{18}F -FDG PET/CT scan was obtained. PET/CT revealed multiple sites of increased glycolytic metabolism in lymph nodes: iliac bilaterally, left lumbar, para-caval and also left supra-clavicular/latero-cervical (Figs 1 and 2). The presence of supra-clavicular lymph nodes was confirmed by ultrasound and CT, and the final diagnosis of metastatic ovarian cancer was reached by biopsy. The patient was then treated by chemotherapy (carboplatin plus taxol plus topotecan) obtaining a good response (a reduction of Ca125 from 273 to 14). The post-treatment PET/CT was negative.

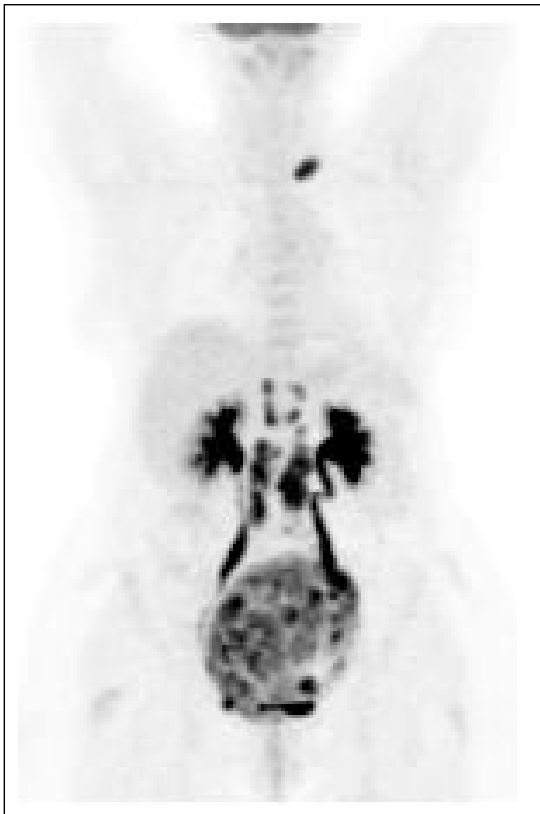


Figure 3 ^{18}F -FDG PET/CT scan revealing increased FDG uptake in the pelvic mass and in multiple abdominal lymph nodes (para-aortic, para-caval, retro-crural), but also in the left supra-clavicular lymph nodes.

Case report 2

A 65-year-old patient was admitted to our hospital in July 2003 for complete staging and subsequently surgery for a pelvic tumour. The patient had already undergone hysterectomy in 1982 for fibrocystic endometriosis. Ultrasound demonstrated the presence of a pelvic mass with non-homogeneous echogenicity; abdominal-pelvic

CT confirmed the presence of a large mass ($17 \times 12 \times 14$ cm) and also showed lymph nodal involvement at para-aortic, para-caval, retro-crural levels. ^{18}F -FDG PET/CT was therefore performed for staging. PET/CT showed an intense radio-tracer uptake in the pelvic mass, and also revealed multiple hypermetabolic lymph nodes in the para-aortic, para-caval, retro-crural and left supra-clavicular regions (Figs 3 and 4). Biopsy confirmed a metastatic spread of ovarian cancer. The patient was then operated on by laparotomy, with mass excision and bilateral annexectomy. Histology showed a poorly differentiated serum-papillary carcinoma. At discharge the patient was scheduled for chemotherapy, but she refused further treatment.

Discussion

Ovarian cancer tends physiologically to metastasise via the lymphatic channels, mainly the intra-peritoneal route and understanding of the sites of spread is crucial for disease treatment^[4]. Lymphatic diffusion of ovarian cancer is commonly retained to involve mainly pelvic lymph nodes and, subsequently, retro-peritoneal lymph nodes^[4].

Data from the literature concerning extra-abdominal lymph node involvement are very poor. In this respect, it is worth noting that a recent review on this topic did not take into account the prevalence of extra-abdominal positive nodes^[11]. The same occurred in a recent paper reviewing nodal metastasis in ovarian cancer^[12]. Conversely, Cormio and colleagues^[5] reviewed 162 patients with epithelial ovarian carcinoma and reported five cases of extra-abdominal lymphatic spread. Interestingly, Zang and colleagues^[6] described their 10-years of experience of patients with ovarian cancer presenting initially with extra-abdominal metastases and reported a significant number of cases with supra-clavicular and inguinal lymph nodes metastases (6 and 5 cases, respectively). Apart from these two papers, a case report described left internal mammary lymph node involvement in a patient with serious borderline ovarian tumour^[13]; two cases of intra-mammary lymph node metastases were described: in a case of early-staged ovarian cancer^[14] and in a case of a borderline papillary ovarian tumour^[15]. Lastly, we found few cases of axillary lymph nodes calcification in patients with metastatic ovarian carcinoma^[16]. These sporadic reports in the literature clearly indicate that extra-abdominal lymph node spread in ovarian cancer is possible although rare^[17].

On the basis of our findings, it may be speculated that ^{18}F -FDG PET/CT is a useful tool and it may be particularly useful to detect unusual extra-abdominal nodal involvement in ovarian cancer.

Further studies on a higher number of patients are required to elucidate the potential role of ^{18}F -FDG PET/CT in evaluating lymphatic metastatic spread of ovarian cancer.

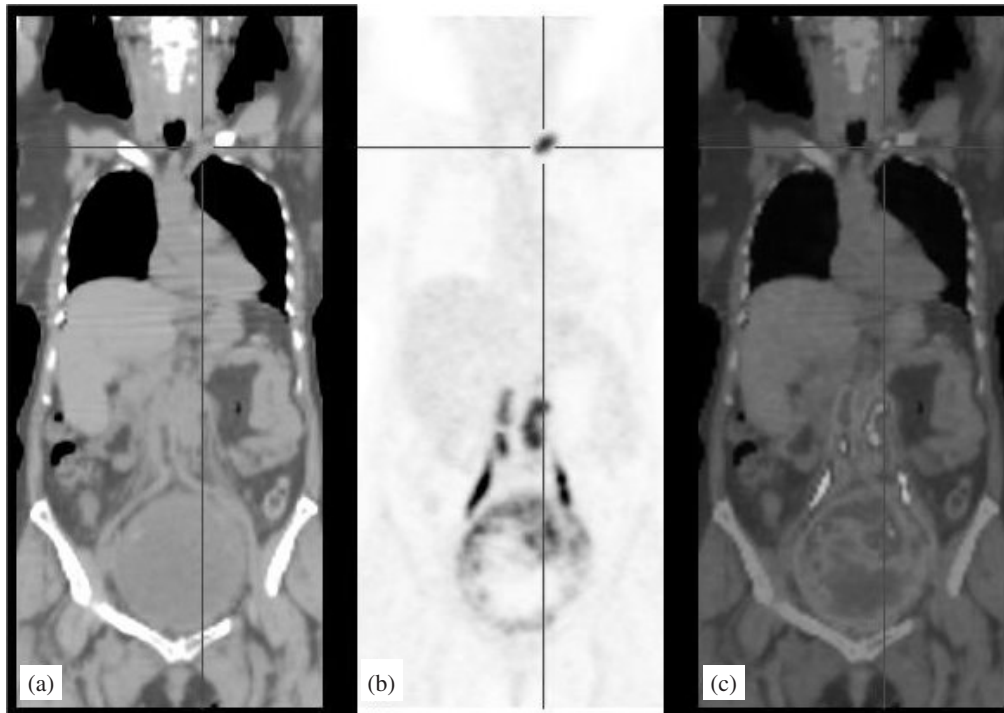


Figure 4 ^{18}F -FDG PET/CT scan: coronal images, (a) CT image, (b) PET image, (c) PET/CT fusion image. A focal area of intense FDG uptake is shown in the left supra-clavicular lymph nodes.

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