Introduction

The role of 2-[18F]fluoro-2-deoxyglucose-Positron Emission Tomography/Computed Tomography ([18F]FDG-PET/CT) in the management of solitary lung nodules has been extensively studied. [18F]FDG uptake reflects on the cell’s glycolytic activity, which is increased in the setting of malignant tumors and during inflammation. This case portrays the paradoxical metabolic behaviour of two lesions, leading to misdiagnosis and erroneous disease staging in an oncology patient. Incidentally, the patient also had an elastofibroma dorsi, a rare benign tumour which can also be a possible source of false results in the PET exam. We provide explanations and possible solutions to these findings in order to familiarise the physician with them, and optimise patient management.

Case description

A 76 year old woman with mild dyspnea, right dorso-lumbar pain lasting 6 months and no other relevant clinical history presented with a hyperdensity in the right lung as revealed by a chest X-ray. A contrast enhanced thorax helical multidetector Computed Tomography (CT) showed a solid parenchymal lesion (27 mm in transax-
ial diameter) in the dorsal segment of the right lung upper lobe with irregular margins and tracts connecting with the pleura. A second solid lesion was localised in the basal pyramid of the right inferior lobe (38 mm in transaxial diameter) of heterogenous characteristics, irregular borders and contacting the scissure. The CT scan also revealed the presence of node involvement in the hilar region of the right lung. The abdomino-pelvic and brain CT were anodyne.

Given the two lung lesions described, the patient was sent to the nuclear medicine department for an $^{18}$F FDG-PET/CT scan for further characterisation. This scan revealed the presence of $[^{18}F]$FDG uptake in the lesion of the right upper lobe with a maximal standardized uptake value corrected for body weight (SUVbw max) of 8.32 and a milder radiopharmaceutical uptake (SUVbw max 3.74) in the inferior right lobe. In the right hilar region, another area of light uptake was identified (SUVbw max 2.66). These findings were all interpreted as viable tumor tissue. Additionally, a $[^{18}F]$FDG extensive uptake was localised in the right infrascapular muscle; the presence of elastofibroma was suggested (fig. 1).

The patient underwent a CT guided biopsy of the right inferior lobe lesion due to better percutaneous access, with the result being a well-differentiated adenocarcinoma.

The tumor was classified as stage IV, given the presence of lung lesions in two different lobes (M1), and followed 4 cycles of chemotherapy (carboplatinum and gemcitabine protocol). The follow-up CT scans (2 and 4 months after the biopsy) showed a decrease in transaxial diameter of the upper right lobe lesion (from 27 to 21 and further on to 20 mm). The more caudal lesion in the right lower lobe, did not show changes in transaxial diameter, though the anterior-posterior diameter seemed to reduce from 32 to 28 mm. Adenopathies visualised in the right hilar region remained stable.

Due to the radiological response, the patient was scheduled for a right upper lobe wedge resection of the lesion and right inferior lobectomy with radical hilar-mediastinal lymphadenectomy. Additional resection of the right infra-scapular lesion observed in the imaging was performed. The histopathologic report showed:

- Adenocarcinoma of right inferior lobe with focal infiltration of the visceral pleura.
- Fragment from the right superior lobe containing multiple small nodules (maximum axial diameter 5 mm) corresponding to chronic giant-cellular necrotizing granulomatous inflammation, positive for alcohol-acid resistant bacilli.
- All lymphadenopathies resected showed histiocitosis, anthracosis and focal giant-cellular granulomatous inflammation.
- Posterior thoracic wall formation was positive for elastofibroma.
The patient recovered successfully and was restaged postsurgically ypT2ypN0. No further adjuvant therapy was indicated, and she was referred to a specialist for specific tuberculous treatment.

Discussion

The role of \(^{18}\)F-FDG-PET in characterising solitary lung nodules has been extensively studied\(^1-5\). Increased \(^{18}\)F-FDG uptake has been reported in almost all tumor types\(^6\) with an accuracy of 96.8% and a specificity of 78\%. However, \(^{18}\)F-FDG is not a tumor specific agent and many benign lesions have demonstrated uptake in PET studies\(^7\), hence histologic confirmation is mandatory in the initial diagnosis of malignancy. Once malignancy is confirmed FDG-PET may also allow staging of disease pursuing radical surgery in the initial stages, neo-adjuvant chemotherapy and surgery in locally advanced tumors, and palliative chemotherapy in patients with IIIB-IV disease. In the presence of several radiologically suspicious lesions, tissue sampling should always be performed whenever possible. In this sense, Borrego et al. study the efficacy and clinical impact of FDG-PET in the staging of non-small cell lung carcinoma in 115 patients showing that the second most frequent site for false positive findings is the lung parenchyma, after the mediastinum. Bypass of equivocal lesions, is therefore specially relevant in this site\(^8\). In our case, the presence of two parenchymal lesions was confirmed through imaging, although pathologic confirmation was only achievable in one of them. The fact that the benign tuberculomas lesion of the upper right lobe had a particularly difficult biopsy access and a surprisingly high FDG uptake, lead to disease upstaging. Through this case report, we therefore want to put emphasis on the relevance of pathologic confirmation of all equivocal lesions as well as the need for a deeper understanding of the biological behaviour of FDG positive lesions which will enable us a more accurate image interpretation.

Solitary lung nodules may sometimes be radiologically identical to tumors; of these, about one third appear to be granuloma\(^9\). Tuberculomas are a late complication of tuberculosis (TB) and appear radiologically as well-defined nodules mainly localised in the upper lobes, showing calcification in only 20-30% of the cases\(^1\), with an average size no bigger than 3 cm in diameter\(^1\). There are several studies on TB lesions showing \(^{18}\)F-FDG uptake mimicking malignancy, such as disseminated systemic TB, lymphadenitis or pneumoni- 

8. Metz M, Durrenberger P, Ith HD, Beger HG, von der Hude S. Interferon-\(\gamma\) release assays showing light-moderate diffuse \(^{18}\)F-FDG uptake with a SUV around 1.8. Physicians should become familiarised with this entity in order to avoid false positive results in cancer patients.

References