

Hypermetabolic axillary lymph nodes in PET-FDG post-vaccination against COVID-19, in cancer patients

Ganglios linfáticos axilares hipermetabólicos en PET-FDG posvacunación contra COVID-19, en pacientes con cáncer

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Summary

Like malignant cells, inflammatory cells can intensely take up F18-fluorodeoxyglucose (FDG). The axillary lymph node inflammatory reaction has been increasingly and globally described after vaccination against COVID-19 with the Pfizer, Moderna and AstraZeneca vaccines, in cancer patients. We present two cases with a diagnosis of ovarian and breast cancer respectively, with a history of recent vaccination against COVID-19, in whom the PET/CT study present hypermetabolic axillary lymph nodes with FDG. Key findings for interpreting increased axillary lymph node uptake in cancer patients who have been vaccinated against this virus are described below.

Resumen

Al igual que las células malignas, las células inflamatorias pueden captar intensamente ¹⁸F-fluorodesoxiglucosa (FDG). La reacción inflamatoria ganglionar axilar se ha descrito en forma creciente y globalmente luego de la vacunación contra COVID-19 con las vacunas de Pfizer, Moderna y AstraZeneca, en pacientes con cáncer. Se presentan dos casos con diagnóstico de cáncer de ovario y mama, respectivamente, con antecedente de vacunación reciente contra COVID-19, en quienes el estudio de PET/TC muestra ganglios linfáticos axilares hipermetabólicos con FDG. A continuación, se describen los hallazgos clave para interpretar el realce aumentado de los ganglios linfáticos axilares en pacientes con cáncer que han sido vacunados contra este virus.

Introduction

Positron emission tomography (PET) is useful in the diagnosis and follow-up of patients with malignant diseases. 18F-fluorodeoxyglucose (FDG) is the most commonly used tracer for this purpose. Due to the nature of glucose metabolism, 18F-FDG-PET/CT findings are not cancer specific and can be found in inflammatory or infectious lesions, leading to false positive findings in patients with malignant tumors (1).

While it is true that false-positive cases after antiviral vaccination have been known for several years, associated with influenza vaccination (2) - including H1N1 (3) - the COVID-19 pandemic has led to mass vaccination against SARS-CoV-2 virus and thus to the appearance of false-positive axillary lymph node cases in patients with cancer and other non-malignant pathologies (4).

Two cases of inflammatory axillary lymph nodes after COVID-19 vaccination in cancer patients are presented below.

Presentation of cases

Case 1

49-year-old woman with ovarian cancer. The patient underwent 18F-FDG-PET/TC eleven days after COVID-19 vaccination in the left upper limb (Figure 1).

Case 2

60-year-old woman with right breast cancer. 18F-FDG-PET/TC three days after application of the vaccine against COVID-19 in the left upper limb (Figure 2).

Discussion

Axillary lymph node inflammatory reaction has been increasingly and globally described after vaccination against COVID-19 with the Pfizer, Moderna and AstraZeneca vaccines, in patients with cancer (breast, melanoma, lymphoma, myeloma, cervix, prostate, osteosarcoma and carcinoid) or with non-malignant pathologies (cardio-vascular and sarcoidosis).

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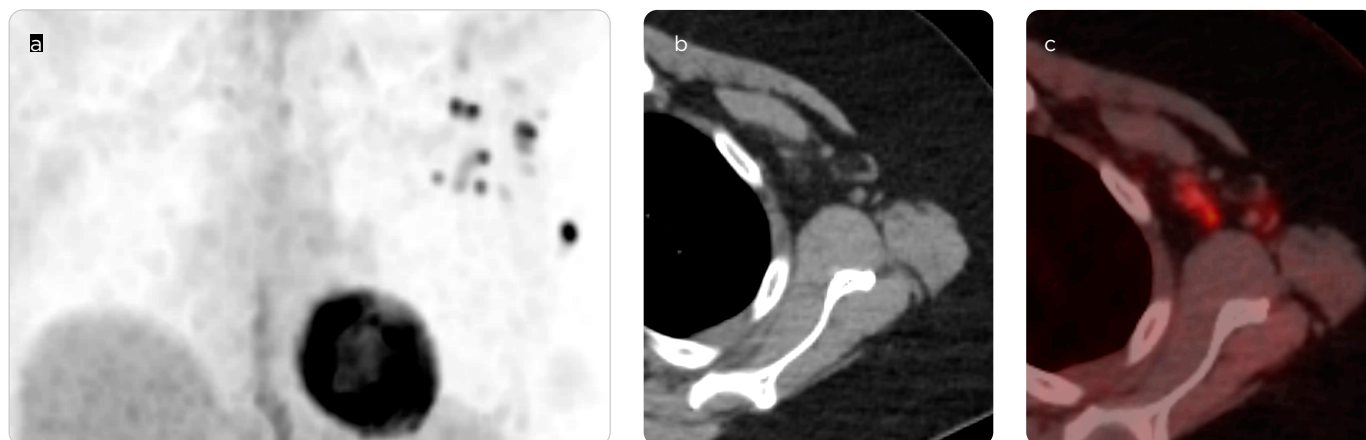


Figure 1. 18F-FDG-PET/CT. a) coronal maximum intensity projection (MIP), b) axial CT of the axillary region and c) axial PET/CT fusion. Increased FDG uptake in the axillary nodes, which have an oval shape with central fatty hilum, with a reactive appearance.

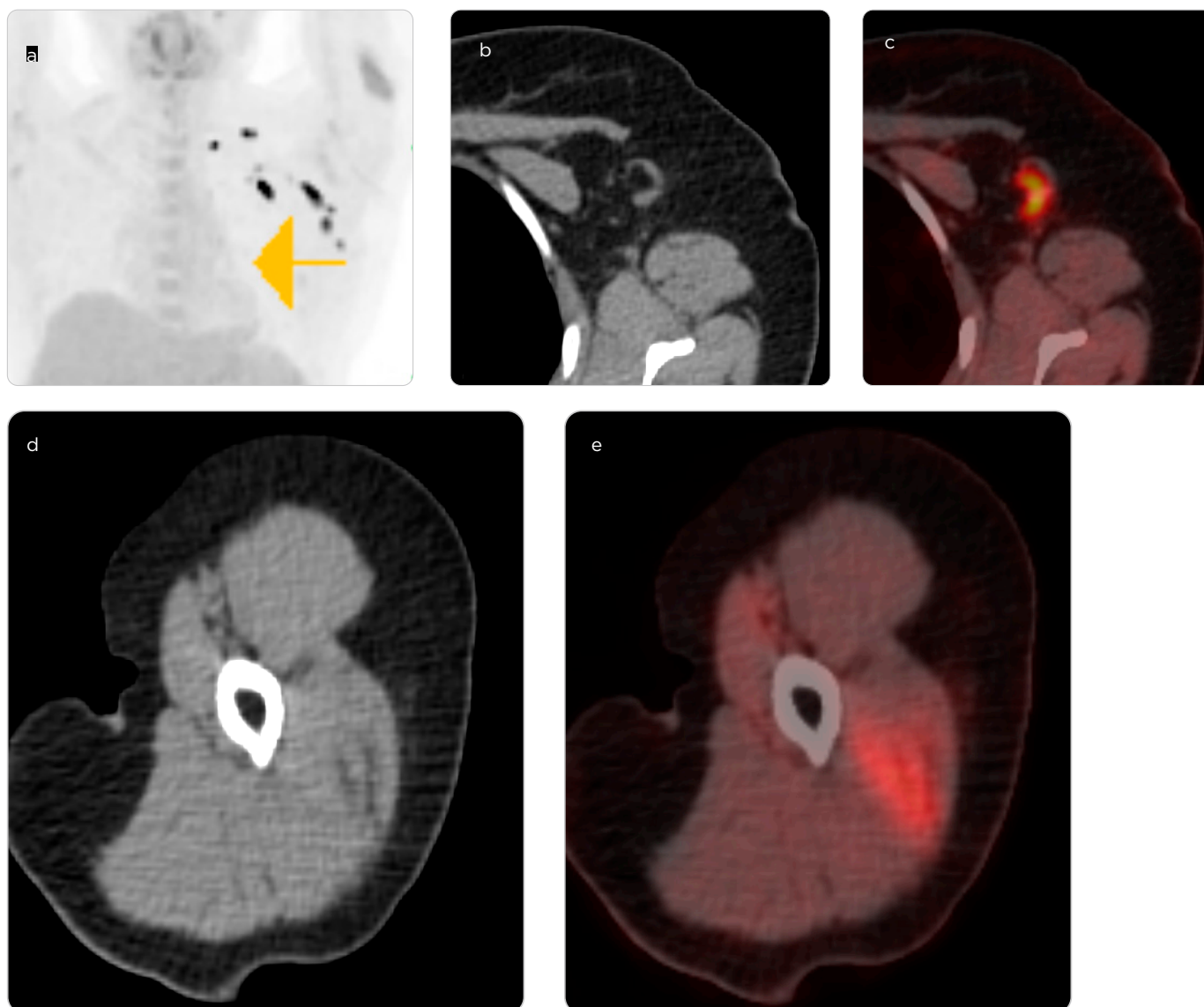


Figure 2. 18F-FDG-PET/CT. a) coronal maximum intensity projection (MIP), b) axial CT axillary region, c) axial PET/CT fusion, d) axial CT deltoid region and e) axial PET/CT fusion. Increased FDG uptake in the left reactive axillary and ipsilateral deltoid nodes.

Almost all the studies performed were with 18F-FDG-PET/CT; in one case PET/MR was performed with the same tracer (5). Like malignant cells, inflammatory cells can uptake FDG intensely due to increased glucose metabolism. Thus, FDG is not a specific marker for malignant cells; in turn, inflammatory lymph nodes can uptake and simulate neoplastic lesions on PET. In fact, this feature has allowed its use in the diagnosis of inflammatory and infectious diseases with good diagnostic sensitivity (6).

Functional abnormalities in lymph nodes demonstrated by increased FDG uptake may precede morphological alterations and thus reactive normal sized nodes may be observed (6), a finding noted in post-vaccination false positive cases (3).

The key findings for interpreting increased axillary lymph node uptake as a false positive in a cancer patient with a history of COVID-19 vaccination are the following: increased FDG activity in the ipsilateral deltoid muscle, the affected nodes are normal or slightly enlarged (9.3 1.7 mm), and the history of recent vaccination, usually less than 14 days (1, 7). Uptake has also been described in axillary lymph nodes of the upper limb in which vaccine against COVID-19 was applied in a patient with suspected neuroendocrine tumor who underwent PET/CT with 68Ga-DOTA-TATE (4), which is a radiolabeled somatostatin analog; the mechanism of uptake in this case is different from that of FDG and is explained because the lymph nodes also express somatostatin receptors (5). Therefore, in the PET/CT study with 68Ga-DOTA-TATE inflammatory reactive lymph nodes can also be observed (5).

The cases presented should alert the diagnostic imaging specialist to the possibility of this false positive. It is therefore essential to know how to interpret the increased uptake of axillary lymph nodes in order not to confuse them with malignant pathology.

In addition, if possible, it is recommended that this imaging study be performed in the follow-up of patients with cancer two weeks after vaccination against COVID-19. These findings in COVID-19 tend to resolve after 12-14 days, but may persist for up to 4-6 weeks (8).

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