Clinical vignette

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Vertebral photopenia on [^{67}Ga]Ga-citrate and [^{18}F]FDG PET/CT imaging in a patient with non-Hodgkin lymphoma

Georgios Meristoudis[1], Ioannis Ilias[2], Vasilios Giannakopoulos[3]

[1]Department of Nuclear Medicine, Hippokration General Hospital, Thessaloniki, Greece
[2]Department of Endocrinology, Elena Venizelou General Hospital, Athens, Greece
[3]Department of Nuclear Medicine, Sotiria General Hospital, Athens, Greece

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Abstract

A cold vertebral defect is an uncommon finding, especially in Gallium-67-citrate ([^{67}Ga]Ga-citrate) — and [^{18}F]fluorodeoxyglucose ([^{18}F]FDG) — avid lymphomas, representing a diagnostic challenge. Here, we present the case of a patient with non-Hodgkin lymphoma (NHL), in whom the [^{67}Ga]Ga-citrate and [^{18}F]FDG scans showed a diffuse skeletal uptake pattern with concomitant appearance of a cold vertebral defect. Awareness of the different causes of such uptake patterns and accurate clinical information is important to avoid misinterpretation of nuclear studies in oncologic patients.

KEY words: cold vertebrae; [^{67}Ga]Ga-citrate; [^{18}F]FDG; PET; vertebral hemangioma

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A cold vertebral lesion is uncommonly seen, especially at the initial staging of ([^{67}Ga]Ga-citrate) — and [^{18}F]FDG-avid lymphomas, representing a diagnostic challenge. The authors report the case of a patient with non-Hodgkin lymphoma (NHL) who underwent [^{67}Ga]Ga-citrate scan and [^{18}F]FDG PET, which showed diffuse skeletal uptake, while a thoracic vertebra appeared as a cold defect. The latter corresponded to a hemangioma identified in prior anatomical imaging studies.

A 29-year-old man with advanced NHL (systemic ALK-negative anaplastic large cell lymphoma; stage IV with bone marrow involvement) was referred for [^{67}Ga]Ga-citrate scan before treatment to assess the lymphoma's gallium avidity. The scan showed focal radionuclide-avid lesions in the soft tissues. Additionally, unexpectedly diffuse increased osseous tracer uptake was observed, with a photopenic region in the 6th thoracic (T6) vertebra (Fig. 1A). Further retrospective review of the patient's history revealed that 3 years earlier, a T6 vertebral osseous lesion was identified in prior anatomical imaging studies; computed tomography (CT) and magnetic resonance imaging demonstrated features compatible with a vertebral hemangioma. Subsequent [^{18}F]FDG PET/CT, performed for further evaluation, revealed hypermetabolic foci in the soft tissues and diffuse increased bone/bone marrow activity, suggesting widespread involvement of the lymphoma. It also showed a photon-deficient lesion within the T6 vertebral body (Fig 1B) in a pattern similar to that seen on the [^{67}Ga]Ga-citrate scan. A [^{67}Ga]Ga-citrate scan, repeated three years after the initial diagnosis, demonstrated that the photopenia at the T6 vertebra persisted (Fig. 1C). Lymphoma evaluation with [^{18}F]FDG shares similarities with [^{67}Ga]Ga-citrate as a functional imaging modality and tumor viability agent. A partial list of possible causes of cold vertebrae on [^{67}Ga]Ga-citrate and [^{18}F]FDG PET imaging would include postexternal radiotherapy, vertebral metastasis, fatty replacement of bone marrow in treated metastasis, vertebral hemangioma, and orthopedic devices. Notably, in this particular case, the diffuse radiotracer accumulation in the skeleton in both functional imaging studies also enhanced the detection of the cold lesion. Diffusely increased radiotracer uptake by the axial skeleton is a nonspecific finding; the phenomenon is common after administration of hematopoietic growth factors, during or after chemotherapy, but can also be caused by malignant diseases and inflammatory or infective conditions. Physicians should be aware of the causes of vertebral photopenia, and the various clinical conditions that may result in diffuse skeletal uptake on [^{67}Ga]Ga-citrate and [^{18}F]FDG imaging, and have accurate clinical information to avoid misinterpretation of functional imaging studies.

Correspondence to: Georgios Meristoudis, Department of Nuclear Medicine, Hippokration General Hospital,49 Konstantinoupoleos St., Thessaloniki, GR-54642, Greece, e-mail: meristoudis@yahoo.gr

Conflict of interest

The authors declare no conflicts of interest.

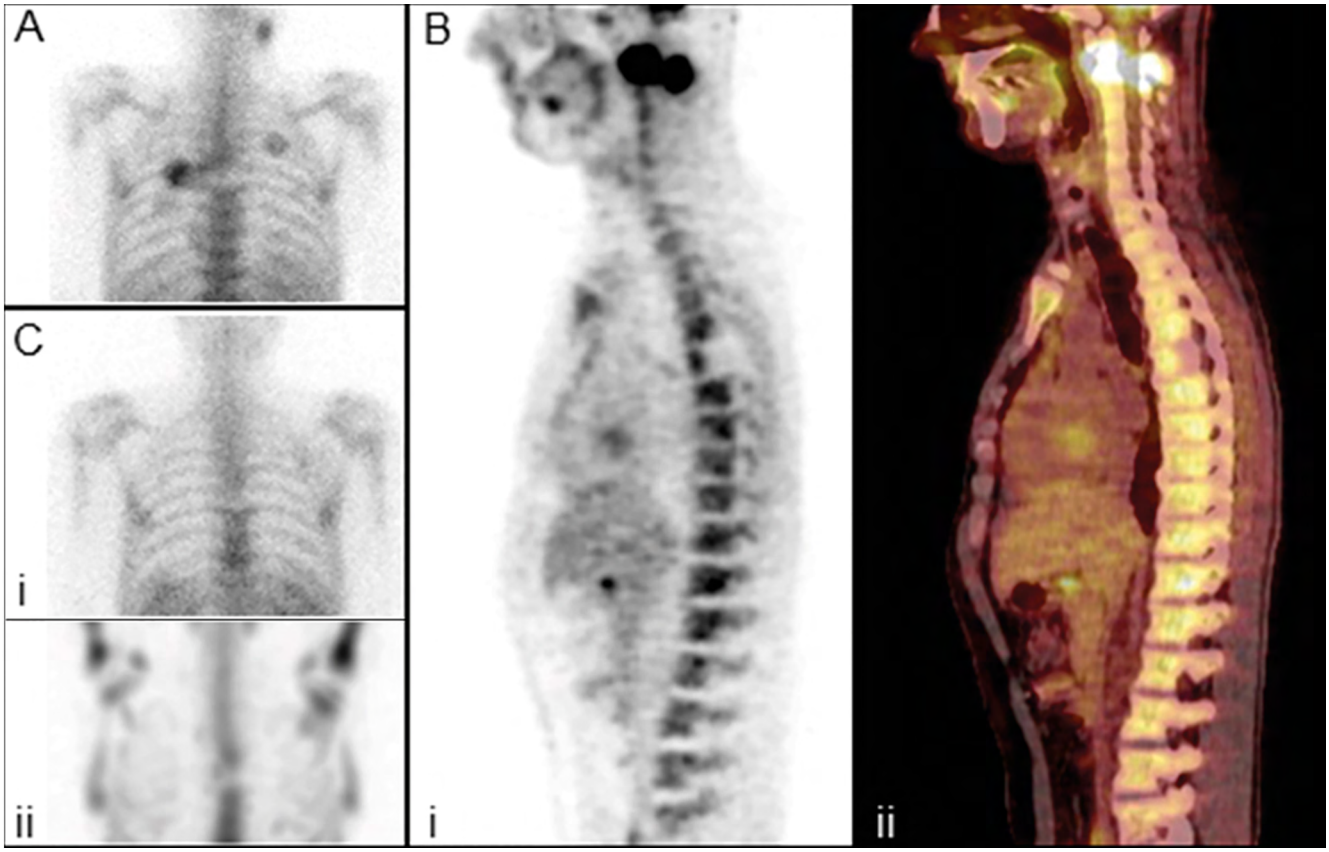

Figure 1. (**A**) Posterior planar [^{67}Ga]Ga-citrate image of the chest shows diffuse increased skeletal uptake and a photon-deficient lesion at the level of the T6 vertebra. (**B**) Sagittal [^{18}F]FDG PET (**i**) and PET/CT (**ii**) slices demonstrate the prominent metabolic activity with slightly heterogeneous distribution within the vertebral bodies and a hypometabolic area in the posterior T6 vertebral body. (**C**) Posterior planar view of the thorax (**i**), and posterior view of the maximum intensity projection (MIP) with single-photon emission computed tomography (**ii**), show that the cold lesion remained unchanged on [^{67}Ga]Ga-citrate scan follow-up