Fluorine-18 Fluorodeoxyglucose Positron Emission Tomography/ Computed Tomography in Hodgkin's Lymphoma: Diagnostic Challenge during COVID Vaccination

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Abstract

Benign metabolic uptake on fluorine-18 fluorodeoxyglucose positron emission tomography (^{18}F-FDG PET) is not uncommonly seen after immunization. We report a case of 30-year-old man with Hodgkin's lymphoma who underwent two cycles of chemotherapy. Interim ^{18}F-FDG PET/computed tomography demonstrated complete metabolic response of prior hypermetabolic bilateral supraclavicular and mediastinal lymph nodes. Although multiple new normal-sized hypermetabolic left axillary and subpectoral lymph nodes are noted, relevant history revealed COVID vaccine 7 days prior scan with mild FDG uptake at the left deltoid muscle. These new findings at the left axilla are likely related to recent vaccination. ^{18}F-FDG PET uptake in the lymph nodes is not so uncommon after immunization; relevant history is very important especially in the phase of massive immunization to avoid false interpretation.

Keywords: *Fluorine-18 fluorodeoxyglucose positron emission tomography, COVID-19, vaccination*

A 30-year-old male who has Hodgkin's lymphoma underwent two cycles of chemotherapy. Interim fluorine-18 fluorodeoxyglucose positron emission tomography (^{18}F-FDG PET) post 7 days of first dose of Oxford COVID vaccine at the left deltoid muscle. Baseline ^{18}F-FDG PET/computed tomography (^{18}F-FDG PET/CT) shows hypermetabolic bilateral supraclavicular and mediastinal lymph nodes [Figure 1]. Interim ^{18}F FDG PET images demonstrate complete metabolic resolution of prior supraclavicular and mediastinal lymph nodes [Figure 2]. There are multiple new normal-sized hypermetabolic left axillary and subpectoral lymph nodes that are noted along with mild increase tracer uptake in the left deltoid muscle. Subsequent ultrasonography of the axilla also revealed normal-looking lymph nodes. Keeping in view of history, these new findings at the left axilla are likely related to recent vaccination, a diagnosis of benign ^{18}F-FDG uptake in the normal-sized axillary lymph nodes is made, and the follow-up is advised.

^{18}F-FDG PET is enormously used in diagnostic staging, restaging, and response evaluation in cancer patients; however, these findings are nonspecific for cancers and can also found in inflammatory and infectious conditions.[1,2] 18F-FDG PET has shown a high overall accuracy in predicting treatment outcome in lymphoma, both during and after completion of treatment; despite that, a study carried out at an interim time point of therapy may not be able to discriminate between the presence of residual viable neoplastic tissue and a nonspecific inflammatory host response.[3] In literature, false-positive ^{18}F-FDG uptake within the lymph nodes is reported after vaccination and has the highest probability if vaccination was administered <8 days before the scan.[4] Increased FDG activity in the ipsilateral deltoid muscle is a key finding for accurate interpretation of increased FDG activity in the axillary lymph nodes.[5,6] However, Ayati *et al*.[7] also reported a case of generalized lymph node activation postinfluenza vaccination.

^{18}F-FDG PET uptake in the lymph nodes by metabolically active tissue due to vaccine-related immune response has been encountered beforehand, and it is considered as a potential pitfall in images interpretation.[8,9] Evidence in the literature

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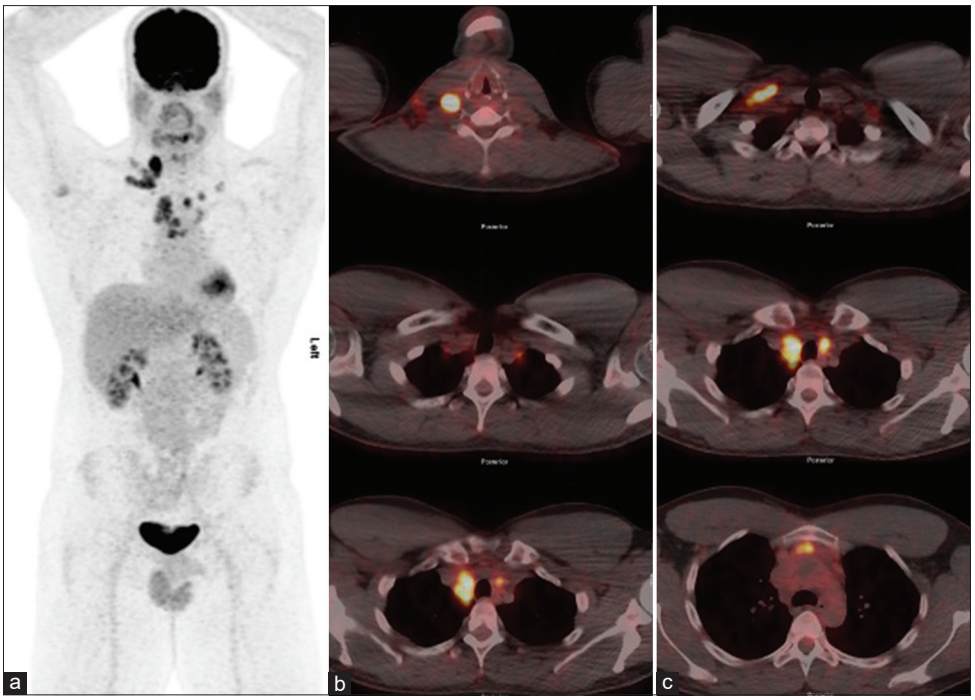

Figure 1: a) Baseline 18F-FDG PET MIP image and b-c) Transaxial PET/CT images show multiple hypermetabolic lymph nodes at bilateral supraclavicular and anterior mediastinal regions

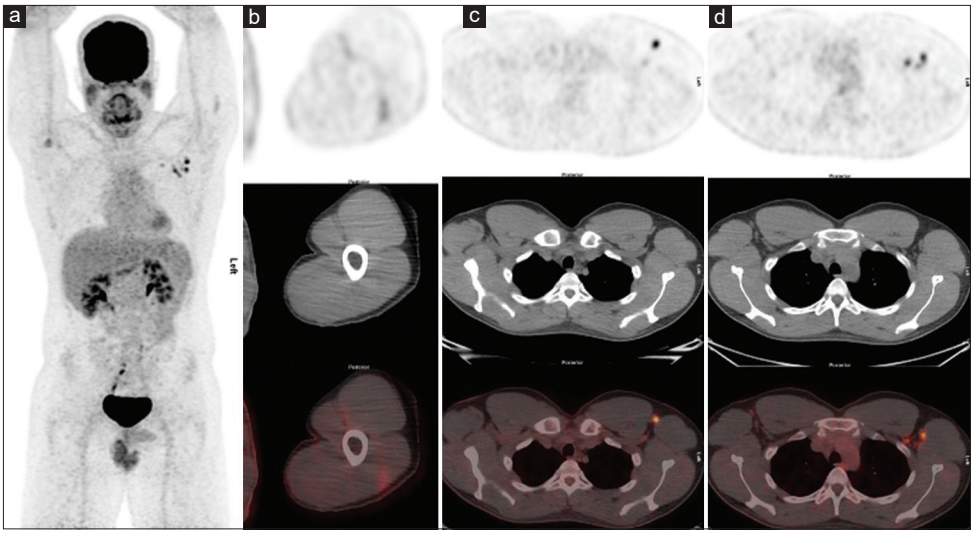

Figure 2: a) Interim 18F-FDG PET MIP image demonstrate complete metabolic response of prior hypermetabolic bilateral supraclavicular and mediastinal lymph nodes. Although multiple new hypermetabolic left axillary and subpectoral lymph nodes are noted. Non-contrast CT images show normal lymph nodes (c,d). Relevant history revealed COVID vaccine 7 days prior scan with mild FDG uptake at left deltoid muscle (b). These new findings at left axilla are likely related to recent vaccination

has documented that the availability of clinical history increases the accuracy of radiologic image interpretation.[10] The role of clinical history is well established in ^{18}F-FDG PET/CT study reporting more significantly in initial interim scans of lymphoma patients as results may alter the management plan considerably that the role was greatly emphasized by the presented case.

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Conflicts of interest

There are no conflicts of interest.

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Unusual Case of Neuroblastoma with Only Growth Plate Metastasis in Bilateral Lower Limbs on Metaiodobenzylguanidine Scintigraphy

Abstract

Neuroblastoma is the most common extracranial solid tumor in childhood developing from primitive neural crest cells. I-131-metaiodobenzylguanidine (MIBG) a norepinephrine analog is highly sensitive and specific to identify primary and distant metastatic sites. We report the case of a 2-year-old female child with progressively increasing abdominal distention. Computed tomography (CT) revealed a large mass lesion involving the right suprarenal region with no hepatic or lymph node metastasis. No obvious skeletal abnormality was detected on the whole-body skeletal survey and Tc-99 m-methylene diphosphonate bone scan to suggest metastasis. I-131-MIBG scintigraphy with single-photon emission computerized tomography-CT showed MIBG-avid primary tumor in a suprarenal location with bilateral lower limbs growth plate as the only site of metastasis.

Keywords: *Growth plate metastasis, I-131-metaiodobenzylguanidine, neuroblastoma, Tc-99 m-methylene diphosphonate bone scan*

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Neuroblastoma is a third common pediatric tumor arising from primitive neural crest cells of the sympathetic ganglion.[1,2] It is an aggressive tumor with the propensity to metastasize to lymph nodes, bone marrow, cortical bone, and liver.[3,4] Tc-99 m-methylene diphosphonate (MDP) bone scan is not routinely advised in the evaluation of neuroblastoma.[5] It can be useful in patients with nonmetaiodobenzylguanidine (MIBG) avid primary tumor and in patients for whom the primary tumor has been excised. One of the common pitfalls described in neuroblastoma on Tc-99 m-MDP bone scan is the blurring of growth plates with the extension of radiotracer uptake in the metaphyseal region in growing bones. In the pediatric age group, this can obscure the underlying skeletal metastasis.[6,7] On the other hand, radioiodine-labeled MIBG imaging is considered as the mainstay in the management of neuroblastoma because of its high sensitivity and specificity.[7-10] It is useful in detecting primary as well as metastatic sites. Although bone marrow/skeletal metastasis is common in neuroblastoma, the involvement of only lower limb growth plates without any other sites of metastases is unusual. In our case, there was no definite skeletal involvement on the Tc-99 m-MDP bone scan, whereas the I-131-MIBG scan showed metastases only to the bilateral lower limb growth plates without other metastatic sites [Figure 1]. To the best of our knowledge, not much data are available in the literature with only growth plate metastasis in neuroblastoma. This unusual presentation of neuroblastoma emphasizes the importance of critical evaluation of Tc-99 m-MDP bone scan in the pediatric population with asymmetrical radiotracer uptake at growing bones and it also reiterates the undisputed role of I-131-MIBG scan in the evaluation of neuroblastoma.

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