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Case Report

Immature Heterotopic Ossification Mimicking Metastatic Progression of the Bone Diagnosed by F-18 Fluorodeoxyglucose (FDG) PET/CT

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Abstract

Seventy three years old asymptomatic male patient with diagnosis of metastatic renal cell carcinoma was imaged by F-18 FDG PET/CT for treatment response evaluation. The image interpretation was suspicious for bone metastasis progression because of the significant FDG accumulation around the previous fixation materials in the left proximal femur diaphysis which was documented to be immature heterotopic ossification by additional bone scintigraphy. This result suggested that the heterotopic ossification is one of the false positive causes and should be interpreted carefully.

Keywords: *Heterotopic Ossification; Metastasis; FDG; PET*

Introduction

Heterotopic ossification is the calcification of the soft tissues with increased calcium accumulation in that tissue. The imaging characteristics are well defined because it is a well-known documented entity. However the metabolic characteristics are less well known due to the relatively recent development of the PET/CT modality. Previous reports in tissues elsewhere the body confirms that the heterotopic ossification might accumulate FDG and Tc-99m methylene diphosphonate as expected [1,2]. In some special circumstances heterotopic ossification might point out an adjacent malignancy [3]. However the FDG accumulation of the heterotopic ossification of the traumatized bone has not been presented before and this report is the first as a presentation and demonstration of immature heterotopic ossification with FDG accumulation as far as we know in the literature.

Case Report

A 73 years old male patient with diagnosis of the metastatic renal cell carcinoma and ongoing treatment and asymptomatic disease course was referred for oncologic F-18 FDG PET/CT imaging for treatment response evaluation. The patient was prepared for examination with at least 6 hours fasting and decreasing physical effort at least 24 hours before the study. The radiopharmaceutical injection was performed (mean 370 MBq (10 mCi), according to the body weight) via venous line 60 minutes before the onset of imaging. The imaging was performed by PET/CT scanner (GE, Discovery PET/CT 610, US) with additional low dose CT scan (130 kV, 50 mAs, a pitch of 1.5, a thickness of 5 mm, in 70 cm field of view) for attenuation correction without intravenous contrast administration with oral contrast administration from the skull base to the upper thigh with the acquisition time of 3 min per bed position. The second follow up examination was performed with the same methodology and imaging protocol. The two set of images were evaluated comparatively by an experienced Nuclear Medicine physician. The oncologic imaging was consisted with minimal progression of the bone metastasis at the metastatic sites but significant progression at the left proximal femora no additional soft tissue metastasis was present in the patient (Figure 1). However the bone metastasis progression was not satisfactory due to the relatively prominent involvement of soft tissue around the implant in the femur. Additional three phase bone scintigraphy was performed in order to exclude or verify the heterotopic ossification which confirmed the immature heterotopic ossification around the left femur (Figure 2).

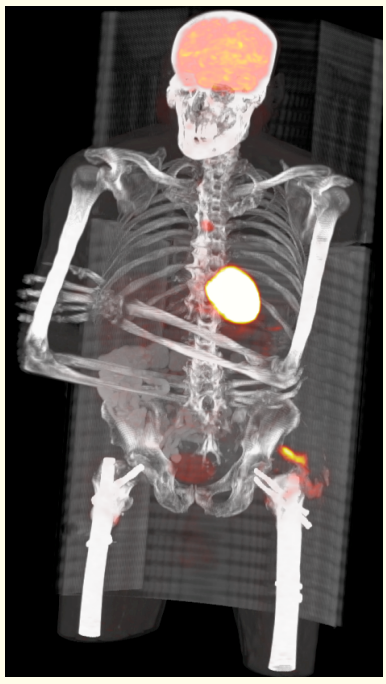

Figure 1(a)

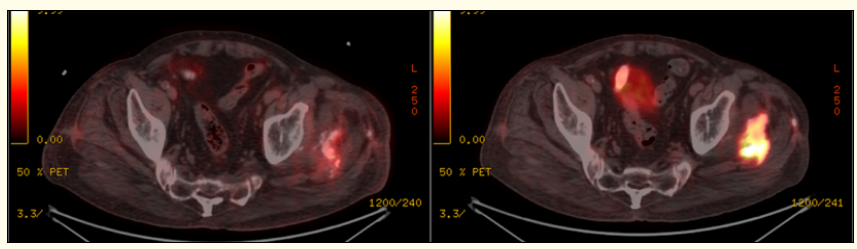

Figure 1(b)

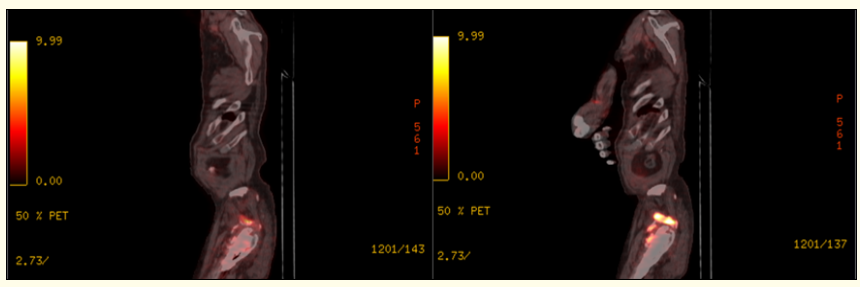

Figure 1(c)

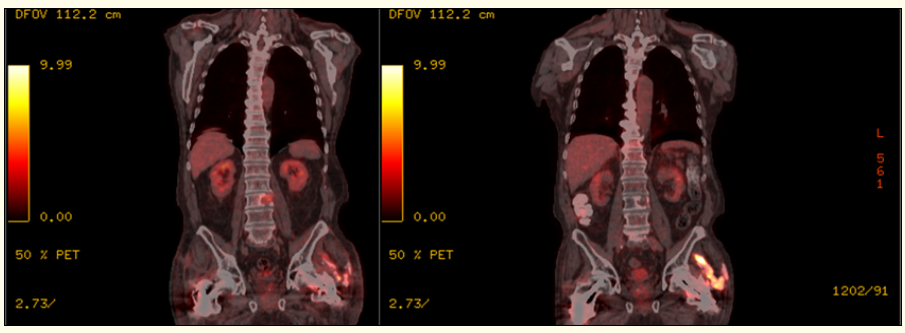

Figure 1(d)

Figure 1: *a. Maximum intensity projection image of F-18 FDG PET/CT showing high increased activity at metastatic sites at multiple vertebral region and around the bilateral femoral prosthetic materials. b. c. and d. transaxial, sagittal, and coronal images (left) respectively covering the left proximal femoral region significantly increased activity accumulation compared to previous (right) PET/CT images.*

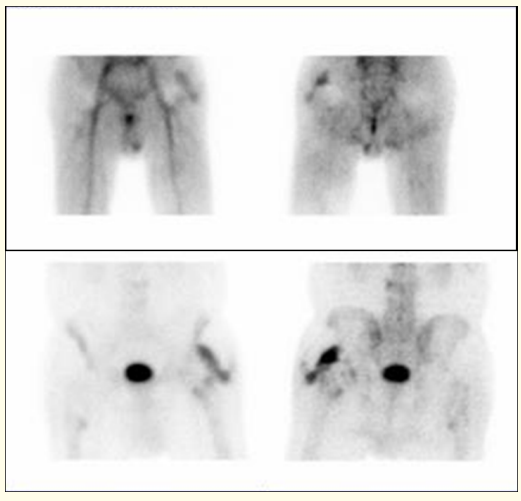

Figure 2: *Three phase Tc-99m methylene diphosphonate bone scintigraphy including bilateral proximal femoral region. The scintigraphy showed increased vascularity in both blood pool and increased osteoblastic activity in the late phase images and confirmed immature heterotopic ossification around the implant of the left femur in soft tissues.*

Discussion

Bone scintigraphy has a well-documented role in the determination of heterotopic ossification and discrimination of immature and mature lesions and recently SPECT/CT improved diagnostic facility of this modality [4]. However there is no report of a case with FDG accumulating heterotopic ossification except soft tissue lesions [1-3]. Heterotopic ossification is a kind of benign metastatic calcification of the soft tissues with an underlying pathogenesis like trauma, inflammation and immobility. A previous case series showed that F-18 NaF PET/CT might be efficient in disease monitoring in a genetic disorder 'fibrodysplasia ossificans progressiva' presents with severe heterotopic ossifications [5]. NaF PET is a more sensitive bone imaging method than bone scintigraphy. Early lesions might be shown by this modality according to this previous report [5].

The patient in this report was receiving an ongoing treatment nearly for one year with a stabile disease course. The last PET/CT examination showed minimal progression of the other bone metastatic sites but significant progression of activity accumulation around the left femur which was previously operated for stabilization of the bone not for curative intend. The FDG PET/CT is currently the most important follow up modality in several malignancies and a reliable method. Unfortunately due to the several false positive causes the results must be interpreted with caution. This patient was an example of a false positive examination which was due to a well-known entity of the surrounding structure of the bone. The discrimination of the interfering pathology was important for the patient who went on current medication. There are several reports of FDG accumulation in heterotopic ossification of the soft tissues elsewhere in the body however this is the first report of FDG accumulation of immature heterotopic ossification as far as we know in the literature.

Conflict of Interest

None.

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