Changes in ^{18}F -FDG PET-CT Appearances of Treated Malignant Melanoma Metastases within the Right Atrium

Tedavi Edilmiş Sağ Atriyum Malign Melanom Metastazlarının ^{18}F -FDG PET-BT Görüntülerindeki Değişiklikleri

Luke Ienari Sonoda, Bal Sanghera, Katharine Nowlan, Emma Roantree, Thomas Wagner, Paul Nathan
Mount Vernon Hospital, Paul Strickland Scanner Centre, London, United Kingdom

Abstract

^{18}F -FDG PET-CT plays an important role in the management of malignant melanoma. Cardiac metastases of melanoma are relatively uncommon, but when present they often manifest with cardiac arrhythmia and cardiac failure. Once treated successfully, lesions in the heart reduce in size and FDG-uptake, while signs of cardiac arrhythmia and cardiac failure may resolve. With a background of normal physiological FDG-uptake in cardiac muscle, a careful observation is required when cardiac metastases are clinically suspected. We report a patient with right atrial metastases of melanoma who presented with new onset atrial fibrillation, and in whom the cardiac lesion reduced in size and FDG-uptake following appropriate treatment, and signs of cardiac arrhythmia spontaneously resolved. The authors believe this is the first set of PET-CT appearances of pre-treatment and treated cardiac metastases of melanoma in the literature.

Key words: PET and CT, melanoma, neoplasm metastasis, heart atria, atrial fibrillation

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Özet

^{18}F -FDG PET-BT malign melanom tedavisinde önemli bir rol oynamaktadır. Kardiyak melanom metastazı oldukça nadir görülmekle birlikte bulunması durumunda kardiyak aritmi ve kalp yetmezliğine yol açabilir. Başarılı bir tedavi ile kalpteki lezyonlar küçülerek FDG-tutulumu azalabilir, kardiyak aritmi ve kalp yetmezliği bulguları da gerileyebilir. Kalp kasında normal fizyolojik FDG-tutulumu olduğundan kalp metastazından şüphelenilen klinik durumlarda dikkatli bir değerlendirme gereklidir. Bu olgu sunumunda yeni başlangıçlı atriyal fibrilasyon ile belirti veren, sağ atriyal malign melanom metastazı olan, uygun tedaviyi takiben kardiyak lezyon boyutu ile FDG-tutulumunda azalma saptanan ve kardiyak aritminin spontan gerilediği bir hasta bildirilmektedir. Yazarlar kardiyak melanom metastazına ait tedavi öncesi ve sonrası PET-BT görüntülerinin literatürde ilk kez belirtildiğini düşünmektedir.

Anahtar kelimeler: PET ve BT, melanom, neoplazm metastaz, kalp atriyumu, atriyal fibrilasyon

Çıkar Çatışması: Yazarlar bu makale ile ilgili olarak herhangi bir çıkar çatışması bildirmemiştir.

Introduction

^{18}F -FDG PET-CT has an active role in staging of metastatic melanoma. Although intra-cardiac metastases of melanoma are relatively uncommon, a careful

observation of cardiac FDG-uptake is required if there are new signs and symptoms of cardiac arrhythmia. Cardiac muscle has intrinsic high FDG-uptake, hence it is often difficult to visualize abnormal foci of FDG-uptake. Contrast-

Address for Correspondence: Luke Ienari Sonoda MD, Mount Vernon Hospital, Paul Strickland Scanner Centre, London, United Kingdom
Phone: +44-02075867410 E-mail: luke@sonoda.co.uk **Received:** 01.07.2013 **Accepted:** 28.08.2013

enhanced CT of the heart may further assist in visualizing the location of abnormal intra-cardiac lesions.

Case Report

A 52-year-old man was referred for an FDG-PET-CT-scan with clinical suspicion of parotid malignancy, and with recent onset atrial fibrillation. The scan demonstrated extensive metastatic disease including cervical and retroperitoneal lymphadenopathy, lung, renal, adrenal, bone and subcutaneous metastases (Figure 1a). In particular, there was a 57 mm focus of intense FDG uptake (SUVmax 23.9) seen within the right atrium suggestive of intra-cardiac metastatic disease (Figure 1b arrows, at two axial levels within the heart). This may explain the new onset of atrial fibrillation. Cervical nodal biopsy confirmed metastatic melanoma. Echocardiogram confirmed a lesion in the right atrium (not shown). The patient was then given a course of oral Vemurafenib 960 mg once a day, a standard treatment for metastatic melanoma. The patient had mixed response to therapy. Overall there was decrease in the FDG avid disease burden and in the intensity of the uptake in previously detected lesions. However, there were a few new skeletal lesions compared to the pre-treatment scan (Figure 1e). After the treatment, the right atrial mass reduced in maximum size by 28% (41 mm), and FDG-uptake reduced by 60% (SUVmax 9.6) (Figure 1c arrow, at the same two axial levels as Figure 1b). Contrast-enhanced CT demonstrated residual atrial disease (Figure 1d arrow). The symptom of atrial fibrillation spontaneously resolved.

Literature Review and Discussion

Most malignant melanoma subtypes are known to be FDG-avid (1,2), hence ^{18}F -FDG PET-CT has been commonly used in

the management of malignant melanoma, in particular, for staging and monitoring response to therapy (3).

Cardiac metastases of melanoma are relatively uncommon (4,5), but when it occurs it often manifests with cardiac signs such as cardiac arrhythmia and cardiac failure (4,6). Other signs and symptoms of cardiac metastases include ventricular inflow obstruction, embolism, valvular heart disease, syncope and pericardial effusion (7). Atrial fibrillation usually accompanies right atrium metastases (8,9).

Primary FDG-avid cardiac tumors are rare, and histologically over three-quarters of primary heart tumors turn out to be benign, almost half of them being myxomas (7).

Other common malignancies that present with cardiac metastases are carcinoma of the lung, breast, oesophagus, lymphoma and leukaemia (7).

Although stage 4 metastatic melanoma is rarely curable, a few new approaches have shown clinical benefit by prolonging overall survival in randomized trials (10). Current treatment regimes of stage 4 melanoma include chemotherapy and immunotherapy (11). One of the most promising treatment options is oral Vemurafenib, a standard treatment for metastatic melanoma (12). Vemurafenib plays a role by inhibiting the mitogen-activated protein (MAP) kinase pathway in patients whose tumors have a V600 mutation in the BRAF gene (13,14,15,16).

Our patient was given oral Vemurafenib 960 mg once a day, and the cardiac lesion demonstrated partial response to therapy. The cardiac lesion has reduced in size and FDG-avidity, and the symptom of atrial fibrillation has resolved appropriately (17).

Figure 1. a: MIP image of whole body ^{18}F -FDG PET pre-treatment scan demonstrates multiple foci of abnormal FDG-uptake due to metastatic melanoma. b: Fused pre-treatment PET-CT images, two different axial slices through the right atrium demonstrate a large focus of intensely FDG-avid right atrial metastases. c: Fused post-treatment PET-CT images, two axial slices same as Figure 1b. The right atrial lesion has significantly reduced in size and in FDG-avidity. d: Contrast-enhanced CT (CECT) at the same axial level (post-treatment scan) delineates the residual right atrial lesion more clearly. e: MIP image of whole body ^{18}F -FDG PET post-treatment scan demonstrates mixed response to therapy, with reduced FDG uptake of multiple foci of metastatic melanoma, but with a few new skeletal lesions, such as right skull base and right proximal femur (arrows)

As the cardiac muscle demonstrates normal physiological FDG-uptake, it is often hard to visualize/localize a possible intra-cardiac metastatic focus. Contrast-enhanced CT or echocardiography may assist identifying such lesions by delineating the cardiac mural surface, as shown in our case (18).

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