

A case of sarcoidosis diagnosed by positron emission tomography/computed tomography

Sabire Yilmaz Aksoy, Elif Özdemir, Aysegül Sentürk¹, Seyda Türkölmez²

Departments of Nuclear Medicine and ¹Chest Disease, Ankara Ataturk Training and Research Hospital, ²Department of Nuclear Medicine, Ankara Ataturk Training and Research Hospital, Yildirim Beyazıt University, Ankara, Turkey

ABSTRACT

Sarcoidosis is a multisystem granulomatous disorder of unknown cause which may affect any organ or system but primarily involve the lungs and the lymphatic system. Extrapulmonary sarcoidosis represents approximately 30–50% of patients. We report the case of a 51-year-old female who presented with increasing complaints of a cough, weakness, weight loss, and chest pain and who was found to have a suspicious lesion on thorax computed tomography (CT). Fluorodeoxyglucose (FDG) positron emission tomography/CT performed for diagnostic purposes demonstrated increased FDG accumulation at the bilateral enlarged parotid and lacrimal gland and in the reticulonodular infiltration area located in the left lung as well as multiple lymphadenopathies with increased FDG accumulation. There were also hepatosplenomegaly and splenic uptake. Skin biopsy showed noncaseating granulomas, and the patient was diagnosed as stage 2 sarcoidosis.

Keywords: Fluorodeoxyglucose positron emission tomography/computed tomography, FDG, sarcoidosis

INTRODUCTION

Sarcoidosis is a multisystem granulomatous disorder of unknown cause which is mostly seen between the ages of 20 and 39 years, but it can also occur in the pediatric population and the elderly.^[1] Although sarcoidosis primarily involves the lungs and the lymphatic system, it may affect any organ or system. Extrapulmonary sarcoidosis is common representing approximately 30–50% of patients, and mostly associated with concomitant thoracic involvement. The diagnosis of sarcoidosis is based on compatible clinical-radiological findings, the histological finding of noncaseating granulomas, and the exclusion of other conditions with similar histological or clinical features.^[2] Patients most commonly presented with cough and dyspnea because of involvement of the lungs. Systemic symptoms including weight loss, fatigue, night sweats, and fever are also commonly seen in these patients. Chest radiography and multidetector computed tomography (CT) are commonly used routine diagnostic

procedures for detecting pulmonary sarcoidosis, but these are unable to show active inflammation.^[3,4]

The nuclear medicine techniques, such as ⁶⁷-gallium scintigraphy and somatostatin receptor scintigraphy, can be used for diagnosis and evaluation of the extent of disease, but their roles are limited because of poor spatial resolution.^[5,6] Recently, ¹⁸F-fluorodeoxyglucose (FDG) positron emission tomography (PET)/CT has been used for the evaluation of inflammatory and infectious diseases including sarcoidosis.^[7] The sensitivity of FDG PET/CT is superior to gallium scintigraphy and is associated with a higher spatial resolution, a faster uptake of the radiotracer providing development of images within 2 h, and favorable dosimetry. In addition, FDG PET/CT better assess the extrapulmonary involvement of the disease.^[8] There have been numerous case series highlighted the usefulness of FDG PET/CT in the diagnosis of sarcoidosis. Some reports proposed that FDG PET/CT can be used as a tool for the differential diagnosis of solid lesions of the chest and for evaluating inflammation and response to corticosteroids in patients with sarcoidosis.^[8–12] Here, we report a case of sarcoidosis diagnosed by PET/CT when searching a possible primary tumor.

Address for correspondence:

Dr. Sabire Yilmaz Aksoy, Department of Nuclear Medicine, Ankara Ataturk Training and Research Hospital, Ankara, Turkey.
E-mail: sbr_ylmz@yahoo.com

Access this article online

Quick Response Code:



Website:
www.ijnm.in

DOI:
10.4103/0972-3919.183608

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How to cite this article: Aksoy SY, Özdemir E, Sentürk A, Türkölmez S. A case of sarcoidosis diagnosed by positron emission tomography/computed tomography. *Indian J Nucl Med* 2016;31:198-200.

CASE REPORT

A 51-year-old female with a history of cough, weakness, weight loss, and chest pain for the last 2 years got the diagnosis of type 2 diabetes mellitus and chronic obstructive pulmonary disease. She presented to the department of chest diseases with increasing complaints and losing 15 kg in 2 months. Chest X-ray showed bilateral hilar lymphadenopathies. Then, CT was performed and revealed that there were reticular and reticulonodular infiltrations and septal thickening in the right upper and left lower lobes as well as bilateral hilar lymphadenopathies which cause concentric narrowing at the left lower lobe bronchus. Transbronchial biopsy was performed from this region with suspicion of the tumoral lesion and showed alveolar macrophages and inflammatory cells. FDG PET/CT performed for diagnostic purposes demonstrated increased FDG accumulation at the bilateral enlarged parotid and lacrimal gland [Figure 1] and in the reticulonodular infiltration area located at left lung [Figure 2] as well as multiple lymphadenopathies with increased FDG accumulation [Figure 3]. There were also hepatosplenomegaly and splenic uptake which all consistent with either lymphoma or sarcoidosis involvement. On this physical examination, maculopapular rashes were noticed at the bilateral dorsum of hand [Figure 4], and histopathological examination showed noncaseating granulomas. Her serum angiotensin converting

enzyme (ACE) level was 176 (normal range: 8–52), and serum calcium level was 9.77 (8.6–10) mg/dl. The patient was diagnosed as stage 2 sarcoidosis.

DISCUSSION

Extrathoracic manifestation is seen in >30% of sarcoidosis cases and typically in combination with the thoracic involvement. Being a whole body imaging method, FDG PET and PET/CT have an important role in the assessment of extrathoracic involvement and in determination of active disease extent. Sarcoidosis may involve any organ including the nervous system, heart, skin subcutaneous tissue, liver, spleen, retroperitoneal lymph nodes, gastrointestinal system, muscles, and bones.^[11] In our case, PET/CT demonstrated bilateral lacrimal-parotid gland uptake and liver-spleen uptake associated with numerous sites of cervical, mediastinal, abdominopelvic, and inguinal lymph node uptake.

Orbital sarcoidosis occurs in 10–50% of the patients with sarcoidosis.^[2] FDG PET/CT and magnetic resonance imaging are helpful for evaluation of the orbital content, especially the lacrimal glands which presents as an enlargement of the gland that is commonly bilateral.^[14] Parotid gland enlargement is rarely seen in sarcoidosis with an incidence of 6% and is often associated with widespread disease as in our case.^[13] FDG PET/CT imaging is helpful to show parotid gland involvement. The finding of increased symmetric gallium activity in the lacrimal, parotid, and salivary glands combined with normal accumulation in the nasopharynx, giving the impression of the mottled coloring of the giant panda is termed as “panda” sign.^[15] This finding has also previously been reported in FDG PET/CT imaging.^[16]

Liver and spleen involvement of sarcoidosis is usually clinically silent and observed in 50–80% of autopsy specimens. It may cause hepatomegaly, cholestasis, and portal hypertension. Nodular hepatosplenic sarcoidosis is more common during the first 5 years of disease, which may be associated with abdominal or systemic symptoms and elevated serum ACE levels. Hepatic and splenic nodules are observed in 5% and 15% of patients in CT studies, respectively.^[17] Hepatosplenic involvement may demonstrate diffuse or multinodular uptake on FDG PET/CT. However, diffuse and moderate FDG uptake in the spleen can be related to nonspecific inflammatory conditions.^[7]

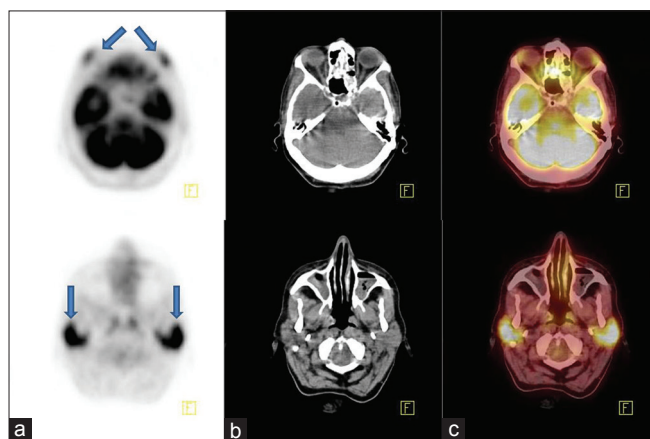


Figure 1: Axial positron emission tomography (a), computed tomography (b), and fusion (c) images of fluorodeoxyglucose positron emission tomography/computed tomography scintigraphy showed increased fluorodeoxyglucose accumulation at the bilateral enlarged lacrimal (upper row, arrow) and parotid gland (lower row, arrow)



Figure 2: Axial positron emission tomography (a), computed tomography (b), fusion (c), and coronal positron emission tomography/computed tomography fusion (d) images demonstrated hypermetabolism at the left parahilar region as well as bilateral hilar lymphadenopathies which cause concentric narrowing at the left lower lobe bronchus



Figure 3: Maximum intensity projection image revealed multiple lesions of the supraclavicular, axillary and hilar lymph nodes, lungs, abdominal-pelvic lymph nodes, liver, and spleen

On FDG PET/CT, sarcoid lesions can demonstrate high standardized uptake values (SUVs) mimicking other pathological processes, including lymphomas and diffuse metastatic disease. Values of up to 15 have been reported in sarcoidosis previously.^[18] There is no reported cut-off value for differentiating benign from malignant lesions by SUVmax value. Because FDG uptake is not specific and may mimic other pathologies, it is important for radiologists and nuclear medicine specialists to be aware of the many possible presentations of sarcoidosis. Furthermore, sarcoidosis may present with a malignancy at the same time in 4–13% of cancer patients which may cause interpretation difficulty.^[19]

FDG PET/CT may also be helpful in detecting potential biopsy sites because the biopsy of metabolically active lesions is more likely led to a diagnostic yield. In the study by Teirstein *et al.*, FDG PET indicated occult diagnostic sites that were not detected by physical examination, standard thoracic radiography, or CT in 15% of 139 patients.^[18]

CONCLUSION

18F-FDG PET/CT can be effectively used in showing thoracic sites of sarcoidosis and also in identifying extrapulmonary involvement in a single imaging session, and to guide biopsy sampling in cases needing pathological confirmation.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Figure 4: There were maculopapular rashes at the bilateral dorsum of hand

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