

¹⁸F FDG PET/CT Findings in a Patient with Sarcoidosis: A Case Report

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ABSTRACT

Sarcoidosis is a multisystem disease characterized by the formation of noncaseating granulomas that can affect any site in the body with extremely variable clinical course. Fluorine -18 Fluorodeoxyglucose positron emission computed tomography (18F FDG PET/CT) is a useful technique for detecting active inflammatory sites in patients with sarcoidosis thus diagnosis, monitoring response and predicting prognosis. Here we present the case of a 44-year-old lady with sarcoidosis having hepatic involvement detected by 18F FDG PET/CT scan. This patient was presented with increasing complaints of low-grade fever, weight loss and generalized weakness for two years who was found to have a hilar lymphadenopathy in chest X-ray and chest CT scan. 18F FDG PET/CT scan performed to see the extent of disease and revealed multiple hypermetabolic mediastinal and abdominal lymph nodes. There was also heterogenous intense FDG uptake (SUVmax:9.6) in liver without definite change on CT likely due to sarcoidosis involvement in the liver. Later on, hepatic biopsy confirmed the diagnosis of hepatic sarcoidosis.

Keywords: Sarcoidosis, 18F FDG PET/CT, granuloma, hypermetabolic lymph node

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INTRODUCTION

Sarcoidosis is a granulomatous disease of unknown etiology with heterogeneous clinical presentations. Mostly seen between the ages of 20 and 39 years, but it can also occur in the pediatric population and the elderly (1). Different organs may be affected with different intensity of inflammation throughout the body. Sarcoidosis primarily involves the lungs and the lymphatic system, but 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 natural

course of the disease and its therapy response is highly variable. Patients may present with systemic symptoms or symptoms according to the organ involved. Usually present with cough and dyspnea due to lung involvement. Systemic symptoms may include weight loss, fatigue, night sweats, and fever. Due to the wide spectrum of symptoms, functional sequelae, and related loss of wellbeing of the patient diagnosis become challenging. Clinical features, biochemical markers (e.g., elevated serum angiotensin converting enzyme (ACE), serum or urine calcium, or lymphocytes in the bronchoalveolar lavage fluid), and abnormalities in imaging (chest radiography, CT, or MRI) are conventionally used to assess (change of) disease activity. However, these markers have a limited diagnostic performance. 18F FDG PET/CT can detect metabolically active granulomatous disease. Various studies over the last decade demonstrate that 18F FDG PET/CT can be helpful in sarcoidosis management, especially in the assessment of organ-specific disease activity (2).

CASE REPORT

A 44-year-old female with history of mediastinal lymphadenopathy came to NINMAS for whole body 18F FDG PET/CT scan. She had H/O low grade fever, weight loss and generalized weakness for two years for which consulted to a physician. Her previous investigations revealed hilar lymphadenopathy on CXR. Chest CT showed thoracic lymphadenopathy in bilateral hilar, right paratracheal, precarinal, subcarinal, prevascular regions and aortopulmonary window and reported as stage-I

sarcoidosis. Serum calcium level was 12.24 mg/dl (ref-8.4-10.2 mg/dl), Serum ACE-137 U/L (ref-12-68 U/L), fiber optic bronchoscopy with bronchoalveolar lavage (FOB+BAL) study showed reactive and inflammatory changes which were in favour of sarcoidosis. AFB staining was negative, Gene expert MTB-negative; tuberculosis was excluded. Then she was advised for PET/CT to see the extent of the disease. PET/CT revealed multiple hypermetabolic mediastinal and abdominal lymph nodes. There was also

heterogenous intense FDG uptake (SUVmax:9.6) in liver without definite change on CT likely due to sarcoidosis involvement in the liver. Patient went abroad for further management. Hepatic biopsy was done there, and hepatic sarcoidosis was confirmed. Patient had previous H/O of carcinoma of right breast 13 years back and treated with surgery followed by chemoradiotherapy. Her tumor marker (CA15-3) was normal. There was no metabolic evidence of recurrence or metastases at mastectomy site or axillary region or skeletal infiltration.

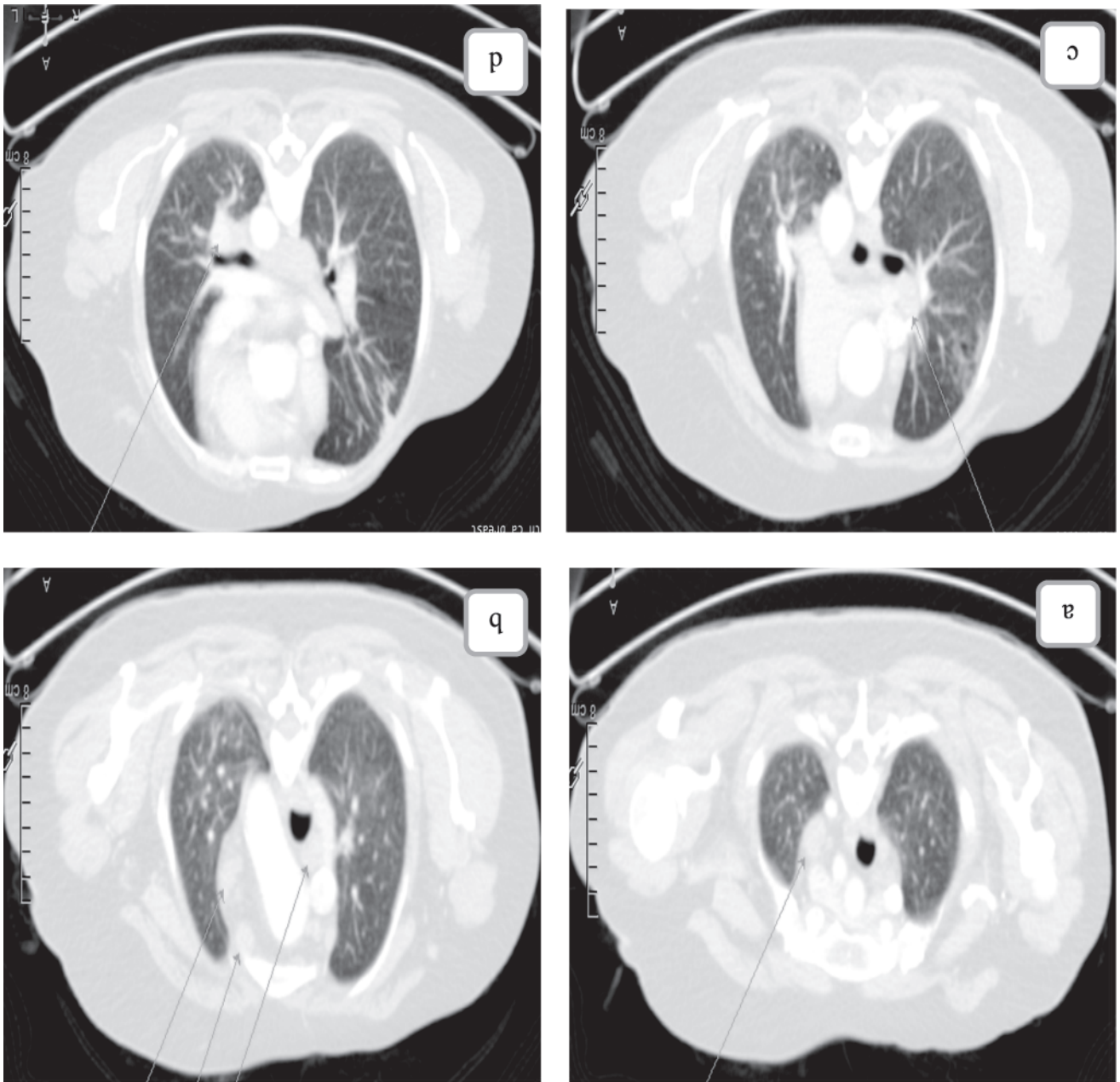


Figure 1: Axial image of CT scan of chest showing Left upper paratracheal (a), right lower paratracheal, paraaortic (b), right hilar (c) and left hilar lymph nodes (d).

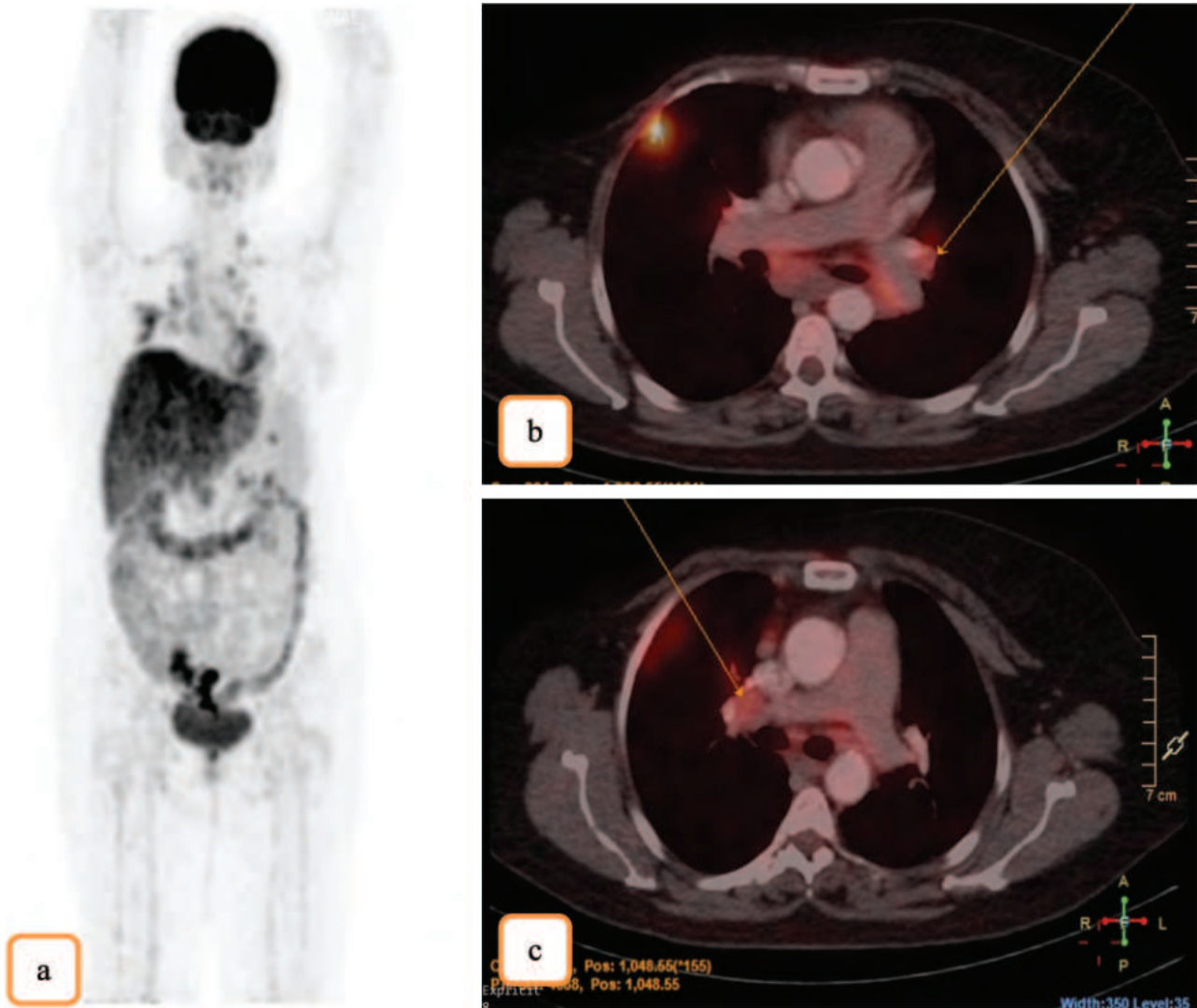
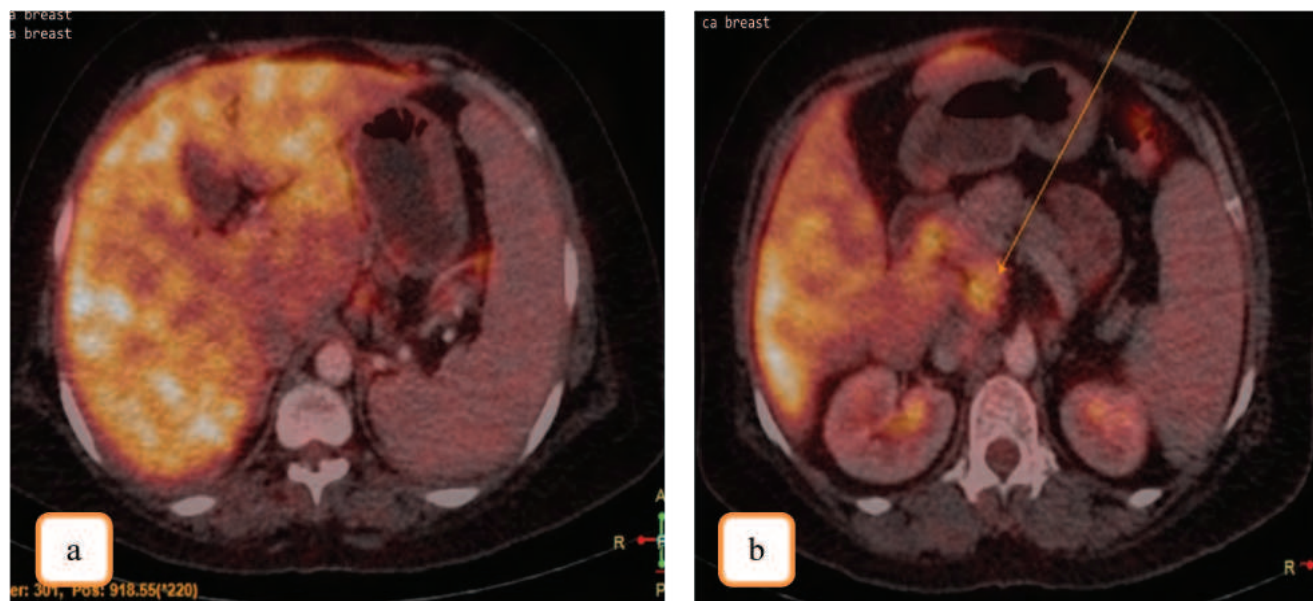


Figure 2: MIP image (a), and axial image of chest(b), (c) in ^{18}F FDG PET/CT showing metabolically active bilateral enlarged hilar lymph nodes suggesting active sarcoidosis.



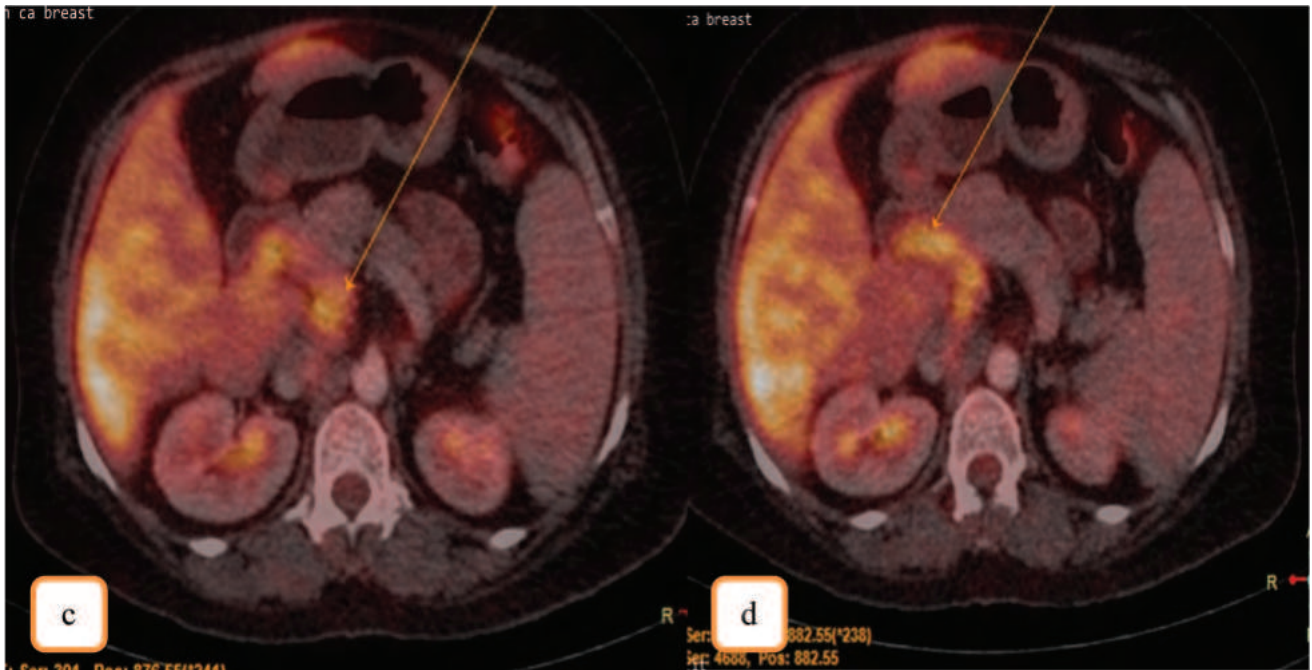


Figure 3: Axial ¹⁸F FDG PET/CT image of abdomen showing heterogenous FDG uptake in liver (a), FDG avid enlarged multiple abdominal lymph nodes (b),(c) and (d) suggesting metabolically active sarcoidosis.

DISCUSSION

Sarcoidosis is a multisystem, chronic, granulomatous disorder with an unknown etiology. However, the immune system plays a critical role in pathogenesis (3). The granuloma of sarcoidosis contains epithelioid cells and multinucleated giant cells surrounded by lymphocytes, macrophages, monocytes, and fibroblasts. The most common presenting symptoms are dry cough, dyspnea, and nonspecific chest pain due to pulmonary involvement. Other symptoms are fever, weight loss, fatigue, malaise, etc. 25% of the patients present with nonspecific symptoms (4). In this reported case, the patient presented with a low-grade fever, weight loss, and generalized weakness.

As sarcoidosis mainly involves the lung and lymphatic systems, clinical signs and symptoms, a chest radiograph, a chest CT scan, and biochemical markers can aid in the diagnosis. Only radiographic findings are adequate for the diagnosis of sarcoidosis. Noncaseating granulomas on biopsy is also not definitive (5). Other causes of noncaseating granulomas should be ruled out first, including malignancy, mycobacteria, fungi, parasites,

other infections, and foreign bodies (6).

Extrapulmonary manifestation is seen in >30% of sarcoidosis and is usually seen in combination with thoracic involvement. ¹⁸F FDG PET/CT scan plays an important role in the detection of extra thoracic sarcoidosis as it is a whole-body imaging procedure. Sarcoidosis may involve any organ, including the nervous system, heart, skin, subcutaneous tissue, liver, spleen, retroperitoneal lymph nodes, gastrointestinal system, muscles, and bones (7). In the reported case, an ¹⁸F FDG PET/CT scan revealed multiple hypermetabolic mediastinal and abdominal lymph nodes. Liver and splenic involvement are 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 the disease, which may be associated with abdominal or systemic symptoms and elevated serum ACE levels (8). Involvement of the liver and spleen 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 (9). The reported case showed heterogenous intense FDG uptake (SUVmax: 9.6) in the

liver without a definite change on CT, likely due to sarcoidosis involvement in the liver, which was confirmed by a hepatic biopsy.

As ^{18}F FDG PET/CT scans demonstrate metabolic activity, sarcoid lesions can show high standardized uptake values (SUVs), mimicking other pathological processes, including lymphomas and diffuse metastatic disease. There is no reported cut-off value for differentiating benign from malignant lesions by SUVmax value, as FDG uptake is not specific. It is important for radiologists and nuclear medicine specialists to be aware of the possible presentations of sarcoidosis. Even sarcoidosis may present with a malignancy at the same time in 4–13% of cancer patients, which may cause interpretation difficulty (10) like in this reported case. ^{18}F FDG PET/CT scan is also useful in detecting potential biopsy sites.

CONCLUSION

This case shows the usefulness of ^{18}F FDG PET/CT for the diagnosis of extrapulmonary involvement in sarcoidosis, which may guide the patient in monitoring treatment response as well as prognosis. ^{18}F FDG PET/CT scans also play an important role in detecting biopsy sites.

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