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Case Report
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18F FDG PET/CT in Extrapulmonary Sarcoidosis

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Abstract

Sarcoidosis is a chronic granulomatous disease and may present with multisystemic involvement. Hepatic involvement is one of the most common extra-pulmonary diseases and was described as 11.5% in cohort studied in ACCESS study. In such cases early diagnosis is the key to early installment of specific therapy. This may not only improve the prognosis but may also salvage the possible system failure. Routine radiological investigation is generally sufficient to make a diagnosis, however, rare case presentations may require further evaluation to assess extent of extra-pulmonary disease involvement. FDG PET/CT demonstrates high grade glucose avidity in active granulomatous lesions and hence can be used for this purpose. Additionally, it also enables determination of treatment response. In this case report we describe a relapse case of pulmonary sarcoidosis, diagnosed to have liver and spleen involvement on FDG PET/CT scan which was confirmed on histopathology.

Keywords: 18F FDG PET/CT; Sarcoidosis; Extrapulmonary; Hepatic; Granulomatous disease

Introduction

Sarcoidosis is a systemic granulomatous disease of unknown etiology. Extra-pulmonary sarcoidosis is known to occur and may involve multiple organs, such as skin, bone marrow, liver, spleen, muscles, etc. Hepatic sarcoidosis alone involves about half the cases [1]. FDG PET/CT demonstrates high grade glucose avidity in active granulomatous lesions [2] and hence can be used for diagnosis of extra-pulmonary extent of disease as well as treatment response. In this case report we describe a relapse case of pulmonary sarcoidosis, demonstrating liver and spleen involvement on FDG PET/CT scan which was confirmed on histopathology. Case Report: A 51year old postmenopausal lady presented with fever, weight loss, decreased appetite and generalized weakness since a month. She had past history of sarcoidosis for which she was treated with steroids. Her recent Angiotensin Converting Enzyme (ACE) values were high. Contrast enhanced CT scan (chest, abdomen and pelvis) was suggestive of discrete sub-centimeter mediastinal and hilar lymph nodes (Figure 1A), mild interstitial fibrosis in both lungs (Figure 1B) and mild hepatosplenomegaly with fatty infiltration (Figure 1c).

FDG PET-CT whole body scan (Figure 2A) demonstrated moderate increased metabolic activity in mediastinal lymph nodes (Figure 2B and 2C). There was heterogeneous increased tracer uptake in entire liver and spleen parenchyma with high grade FDG avidity (Figure 2D and 2E). In clinical context of raised ACE, findings were concerning for granulomatous disease involvement and liver biopsy was suggested. Histopathology revealed distortion of normal lobular and cord pattern of liver cells, swollen hepatocytes with marked macro vesicular steatosis, composed of epitheloid histiocytes, neutrophils, few eosinophils and occasional multinucleate giant cells. Fibrin deposition was also evident within granulomas (Figure 3A-3C); findings suggestive of multiple non-caseating hepatic micro-granulomas.

Discussion

Extra-pulmonary sarcoidosis is not uncommon, although it is almost always found with concomitant thoracic involvement [3]. Frequently extra-pulmonary manifestations of the disease are the major cause of morbidity. Treatment often requires consideration of alternative immunosuppressive agents and specific consideration towards the organ system involved [4].

Liver and spleen are the most frequently involved viscera, with presence of non-caseating granulomata noted in 40% to 70% of cases [1]. Patients with liver disease may be asymptomatic or may progress to chronic cholestases and portal hypertension. In few cases, this may lead to hepatic failure. When hepatic failure ensues, it is difficult to revert the changes and the patient may require transplant. Hence, complete systemic evaluation for extra-pulmonary organ involvement is imperative. Multiple imaging modalities are used, especially CT scan, for non-invasive diagnosis.

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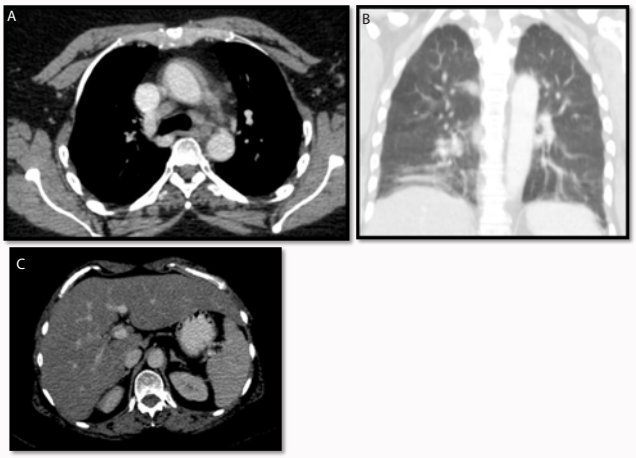

Figure 1: CECT (chest, abdomen and pelvis): demonstrate discrete sub centimeter mediastinal and hilar lymph nodes (transaxial image Figure 1A), mild interstitial fibrosis in both lungs (coronal image Figure 1B), hepatosplenomegaly with fatty infiltration in hepatic parenchyma (transaxial image Figure 1C).

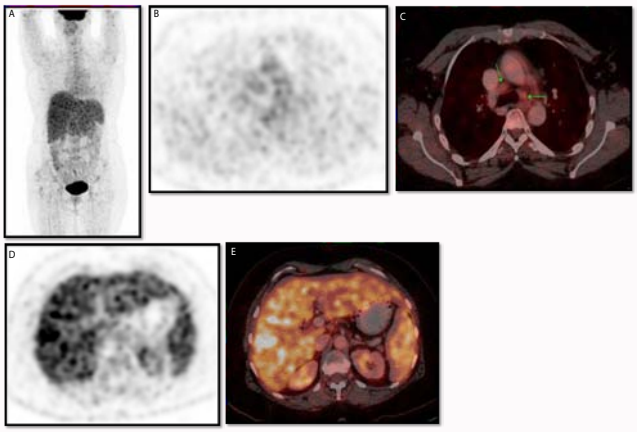

Figure 2: 18F FDG PET/CT Whole body images (MIP Figure 2A) demonstrate moderate grade activity in mediastinal nodes (dedicated PET scan transaxial image Figure 2B and fused PET-CT transaxial Figure 2C). High grade heterogeneous FDG activity in entire liver and spleen (dedicated PET scan transaxial image Figure 2D and fused PET-CT transaxial Figure 2E).

However, in most studies (and so in present case study), the liver is homogeneous in appearance and hypo-attenuating nodules are rarely seen [1].

FDG PET scans, on the other hand, shows high sensitivity in localizing granulomatous pathogenesis [2]. The uptake mechanism depends on number of glucose transporters expressed on cell surface. In case of infection/inflammation, activated inflammatory cells have increased expression of glucose transporters. Also, the affinity of these transporter for deoxyglucose increases by various circulating cytokines and growth factors [5,6]. This determines localization of FDG in infective sites. There are other areas demonstrating increase FDG uptake in setting of infection/ inflammation, such as bone marrow, spleen and thymus (in children and adolescents). These areas are integral part of immune system and are involved in production of inflammatory substances, antibodies and immunoglobulins. FDG uptakes in these areas are usually low grade and diffuse as compared to focalized uptake in area of infection. In case of Sarcoidosis, FDG PET scan helps in determining pulmonary and extra-pulmonary extent of disease and type of therapy to be instituted [7]. The degree of

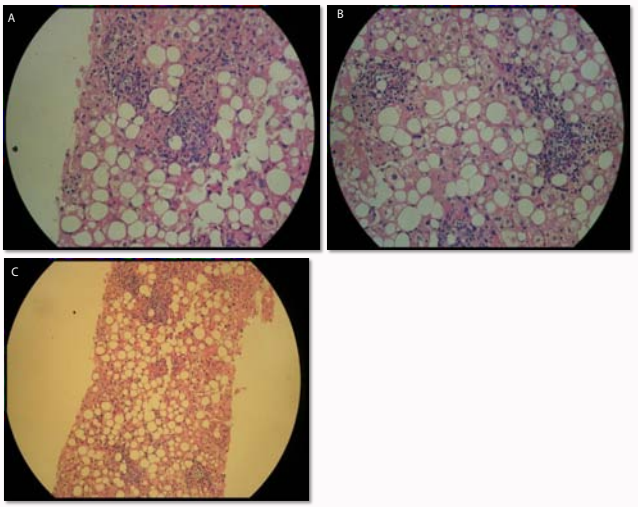

Figure 3: Microsopy (Figure 3A, 3B and 3C) showed distortion of normal lobular and cord pattern. Swollen hepatocytes with marked macrovesicular steatosis and central fat vacuole. These appear composed of epitheloid histiocytes, neutrophils, few eosinophils and occasional multinucleate giant cells. Fibrin deposition was evident within granulomas. Portal and peri-portal fibrosis was present.

FDG uptake also correlates with disease activity and could be used for treatment monitoring and response purposes [8]. In above presented case, pattern of high glucose metabolism in liver and spleen on FDG PET scan in light of raised serum ACE levels largely favored hepatic sarcoidosis. Such pattern recognition may benefit the clinicians to establish a better treatment protocol at an early stage.

Conclusion

Involvement of extra-pulmonary sites in cases of Sarcoidosis often requires aggressive treatment approach. Since this has an influence on prognosis, FDG PET/CT scan can serve as a single step valuable tool in Sarcoidosis evaluation.

Teaching Point

Increased glucose metabolism in liver and spleen, on FDG PET scan, have varied differential diagnosis including diffuse liver disease like cirrhosis, granulomatous disease, metastases and primary malignancy such as lymphoma. Understanding the pattern of uptake may lead to narrow the diagnosis and could be further confirmed on specific laboratory and histopathologic investigation.

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