Lymph node tuberculosis before treatment, under treatment and post-treatment detected by $^{18}$F-FDG PET/CT

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Abstract

Introduction: People infected with Mycobacterium Tuberculosis (TB) stay infected for a long time. Infected people may not develop tuberculosis disease and were asymptomatic. Once progressing to disease, it can affect most tissues and organs, but especially the lungs.

Case presentation: We report a case of a 40-year-old woman who initially presented with dry cough for 3 months. $^{18}$F-FDG PET showed increased $^{18}$F-FDG uptake in the mediastinal, bilateral hilar, and peri-pancreatic regions lymph nodes. Sputum for tuberculosis culture revealed Mycobacterium spp. and TB was impressed. After anti-TB treatment for 6 months, 2nd $^{18}$F-FDG PET study revealed more intense $^{18}$F-FDG uptake and increased number in the mediastinal and bilateral hilar lymph nodes and sputum culture still revealed Mycobacterium spp. So the patient was referred to a tuberculosis center for further treatment as treatment failure. Follow up 3rd and 4th $^{18}$F-FDG PET/CT study after 6 and 11 years respectively, showed previous lymph nodes faded and almost invisible.

Conclusion: $^{18}$F-FDG PET/CT scan has potential use in patients with TB treatment following.

Keywords: Lymph node; Tuberculous treatment failure; $^{18}$F-FDG PET/CT.
Introduction

Mycobacterium Tuberculosis (M.tuberculosis) infects one third of the world’s population. Once infected with M.tuberculosis, a person stays infected for many years, probably for life. The vast majority (90%) of people without human immunodeficiency virus infection who are infected with M.tuberculosis do not develop tuberculosis disease. Infected persons can develop tuberculosis disease at any time. Disease can affect most tissues and organs, but especially the lungs [1]. Tuberculous lymphadenitis is among the most frequent presentations of extrapulmonary Tuberculosis (TB). Cervical and mediastinal lymph nodes are involved in 70% of the cases, followed by axillary, mesenteric, hepatic portal, peri-hepatic, and inguinal lymph nodes [2].

Case report

A 40-year-old woman complained dry cough for three months. [18]F-fluorodeoxyglucose ([18]F-FDG) PET study (Siemens ECAT EXACT HR+; Knoxville, TN, USA) of the whole body (Figure 1A) revealed increased [18]F-FDG uptake in the mediastinal, bilateral hilar and peri-parenchymal regions lymph nodes. Later, she received sputum cytology and culture. Sputum for TB culture revealed mycobacterium tuberculosis complex was isolated by Lowenstein-Jensen (LJ) medium. Chest X-ray showed bilateral hilar enlargement. She received a standard regimen (2HERZ/4HER) for a new patient who had no history of prior TB treatment. 2HERZ/4HER means isoniazid 300 mg/d, rifampicin 600 mg/day, ethambutol 0.8 g/day, pyrazinamide 1.5 g/day daily for two months, followed by four months of isoniazid 300 mg/d, ethambutol 0.8 g/day and rifampicin 600 mg/day given daily. After 6-month anti-TB treatment (ethambutol 1.2 g/day, isoniazid 300 mg/day, rifampicin 600 mg/day, pyrazinamide 0.8 g/day), 2nd [18]F-FDG PET and delayed chest PET/CT (Discovery LS, GEMedical System. Waukesha, Wisconsin, USA) study (B) revealed more intense [18]F-FDG uptake and increased number in the mediastinal and bilateral hilar lymph nodes. Peri-pancreatic lymph node showed no apparent change of [18]F-FDG uptake. Chest X-ray showed bilateral hilar enlargement, no apparent change. Treatment failed at month 6 during initial empiric treatment, sputum culture revealed mycobacterium tuberculosis complex was isolated by LJ medium. She was evaluated carefully to identify the cause of the delayed sputum conversion. She was referred to a tuberculosis center. Streptomycin and fluoroquinolone were given. Four months later, sputum for TB culture was negative. About 6 years later, 3rd [18]F-FDG PET/CT (Siemens Biograph mCT) study (C) revealed less intense 18F-FDG uptake and decreased number in the mediastinal and bilateral hilar lymph nodes. Peri-pancreatic lymph node showed no [18]F-FDG uptake. More 11 years later, she complained lower abdominal fullness for two weeks with ultrasound and physical examination negative, and 4th [18]F-FDG PET/CT study (D) revealed [18]F-FDG uptake in the mediastinal and bilateral hilar lymph nodes almost invisible. [18]F-FDG accumulation in the right renal pelvis and right ureter due to distal ureter stone. She then received ureteroscopic stone manipulation for right ureter stone. Later she felt low abdominal fullness was subsided.

Discussion

The following are forms of extrapulmonary TB: pleural effusion (pleura are outside the lungs); hilar lymphadenopathy (hilar lymph nodes are outside the lungs); miliary (TB is widespread throughout the body and not limited to the lungs) [1]. Our case showsmediastinal lymphadenopathy and differential diagnosis should consider lymphoma, bronchial carcinoma and sarcoidosis, except TB [3]. Patients with mediastinal TB disease report only minor and non-specific physical complaints; in particular, fever, weight loss, loss of appetite, nocturnal sweats are frequently described [4].

Tuberculous lymphadenitis is characteristically slow to respond to effective treatment, and nodes may enlarge during treatment or after cessation of treatment [2]. Lymphadenopathy usually disappears in 30–40% of patients after 3 months of antituberculous chemotherapy and in 80% after 6 months of treatment.

Treatment failure has been reported from many countries of the world, ranging from 0.9% in Thailand to 2.5% and 4.8% in Nigeria [5]. Some clinical predictors to prevent treatment failure were showed in past studies. For example, one past study showed positive sputum smear at 2 months of TB treatment and poor adherence to anti TB treatment were found to be predictors of TB treatment failure [6].

[18]F-FDG PET/CT as predictors in TB also showed potential in past studies. Past studies showed quantification of [18]F-FDG PET-CT images better characterised TB treatment outcomes than qualitative scan patterns and robustly measured the burden of disease, 7 valuable in TB staging and locating extrapulmonary TB, identifying patients with subclinical TB, and assessing early treatment response [8]. Past studies also remind us that lack of specificity is a limitation. For example, [18]F-FDG PET/CT cannot reliably differentiate active TB lesion from malignant lesions, false positives can also be due to other infective or inflammatory conditions and unable to distinguish tuberculous lymphadenitis from metastatic lymph node involvement [8].

In this case, the image after 6 months TB treatment compared with before treatment showed increased [18]F-FDG uptake in the mediastinal, bilateral hilar lymph nodes and no decre-
ment in peri-pancreatic regions lymph nodes and the following culture proved persistent infection. Our long term image following may imply the 18F-FDG PET/CT scan has potential use in patients with TB treatment following. The appropriate timing to follow TB treatment response and ideal candidate patient with 18F-FDG PET/CT remain unknown and also deserve further study.

References


