Melioidosis Presenting as Septic Arthritis: The Role of F-18 Fludeoxyglucose Positron Emission Tomography/Computed Tomography in Diagnosis and Management

Abstract
Melioidosis, caused by the soil saprophyte *Burkholderia pseudomallei*, is a great mimicker. With its wide variety of presentations which are often nonspecific, a good clinical suspicion is required for the timely diagnosis of the disease. F-18 fludeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) has a well-established role in the diagnosis and management of various infective diseases. Given the multifocal nature of this disease, we believe that F-18 FDG PET/CT has a definite role in improving the management of melioidosis. Here, we discuss a case of melioidosis presenting as septic arthritis and the role of F-18 FDG PET/CT in the management of the disease.

Keywords: *Burkholderia pseudomallei*, F-18 fludeoxyglucose positron emission tomography/computed tomography, fever of unknown origin, melioidosis, septic arthritis

Introduction
*Burkholderia pseudomallei* is a Gram-negative, motile, obligatory aerobic, nonspore-forming bacillus. It is a soil saprophyte which spreads to humans via inhalation or inoculation. Host factors which predispose to the infection include diabetes mellitus, chronic renal failure, alcoholism, cirrhosis, chronic pulmonary disorder, malignancy, and immunocompromised status.[1,2]

Melioidosis is notorious for its wide variety of presentation and relapsing nature. The clinical presentation can be acute localized form, chronic form, pulmonary form, or acute septicemia. Clinically, it mimics pyogenic bacterial infection, Gram-negative sepsis, tuberculosis, or even polyarthritis.[3]

F-18 fludeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) being a whole-body functional imaging may be used to evaluate patients with melioidosis. Here, we report a case of melioidosis in which F-18 FDG PET/CT was used to evaluate the extent of disease.

Case Report
A 41-year-old male from Bangladesh presented to our hospital with complaints of dry cough, intermittent episodes of fever for the past 2 months, and weight loss of 17 kg over the previous 2 months. He was diabetic and had been on oral hypoglycemic agents and insulin for the past 1 year. He had no significant travel history to endemic regions.

On presentation to our hospital, he was febrile with stable vitals. On examination, he was found to have swelling around the right knee joint which was warm to touch and with restricted movements (120°). Laboratory test results showed an elevated serum C-reactive protein level of 165 mg/dl, elevated erythrocyte sedimentation rate of 93 mm/h, and normal white blood cell count. The differential diagnoses considered were tuberculosis, infective endocarditis, and malignancy. Two-dimensional echo was normal with no evidence of any valvular vegetations. Chest X-ray showed patchy inhomogeneous opacities in both lower zones and trace left pleural effusion. He was put on empirical antibiotics, but continued having fever with increase in swelling of joints. CT chest was acquired, which revealed multiple patchy alveolar opacities in the bilateral upper and right middle lobes with adjacent ground glassing, mild bilateral pleural effusion, and few reactive mediastinal lymph nodes.

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lymph nodes. Ultrasound of the knee showed effusion and the fluid was aspirated. Blood and joint aspiration fluid were sent for microbiological cultures both of which grew *B. pseudomallei*. Since the organism was known for its multifocal involvement, an F-18 FDG PET/CT was planned. F-18 FDG PET/CT [Figure 1] revealed mildly FDG-avid fibrocavitatory changes in the apical segment of the right upper lobe (maximum standardized uptake value \[SUV_{\text{max}}\] 2.5) [Figure 2], non-FDG-avid nodules in the left lung, hypermetabolic subcarinal and left hilar lymph nodes [Figure 3], hypermetabolic hypodense lesion in segment VIII of the liver (size 1.0 cm × 1.2 cm \[SUV_{\text{max}}\] 2.6), hypermetabolic collection in the pericecal region (size 1.2 cm × 2.7 cm \[SUV_{\text{max}}\] 4.0) [Figure 4], effusion with FDG uptake in the right knee joint (\[SUV_{\text{max}}\] 4.7), and focal hypermetabolism noted in the left proximal tibia (\[SUV_{\text{max}}\] 3.4) [Figure 5].

He was started on ceftazidime 50 mg/kg Q6H for 3 weeks and levofloxacin 750 mg and cotrimoxazole 960 mg planned for 3 months.

On follow-up after 1 month, his symptoms had come down, he was afebrile, and he had gained weight.

**Discussion**

Melioidosis presents as a febrile illness which ranges from acute septicemia to chronic relapsing infection. The disease is characterized by abscess formation either localized or simultaneously involving multiple sites.

In a descriptive study involving 540 patients in tropical Australia over a 20-year period, the primary presenting feature was pneumonia (51% of patients), followed by genitourinary infection (14%), skin infection (13%), bacteremia without evident focus (11%), septic arthritis or osteomyelitis (4%), and neurologic involvement (3%). The remaining 4% of patients had no evident focus of infection.[3]

Because of the widely varied clinical presentations, radiological manifestations often provide clues to diagnosis. Pneumonia is the most common clinical and radiological manifestation. It usually manifests as an upper lobe infiltrate with or without cavitation, which often mimics...
tuberculosis. Other features seen include abscesses and multiple nodules with or without empyema.\[4\]

Other clues pointing toward melioidosis in a patient with septicemia or fever of unknown origin include (1) Multiple splenic abscesses, (2) concurrent hepatic and splenic abscesses, and (3) lesions in the periphery of the prostate with normal or mildly raised prostate-specific antigen. Musculoskeletal involvement may present as multifocal osteomyelitis or septic arthritis.\[4\]

Role of F-18 FDG PET/CT in the diagnosis or management of melioidosis is not well established. Case reports have described the utility of PET/CT in the initial evaluation and in managing the length of antibiotic therapy.\[5\] Given the multifocal nature of the disease, F-18 FDG PET is a useful tool in detecting the location and extent of abscess formation, assessing the organs involved and detecting occult foci of infection. In this case, PET/CT helped in identifying other foci of infection such as hepatic abscess, left tibial involvement, and pericecal abscess which were not known previously. PET/CT can also help in guided aspiration of abscesses, which can help in diagnosis as well as management of the disease. As a limitation in this case, follow-up PET/CT was not obtained. However, F-18 FDG PET/CT may be used to assess the patient response as well. It may also help in determining the duration of antibiotic therapy in the maintenance phase. Recognition of multifocal involvement has prognostic value as well. There is proven association between clinical outcome and organ involvement as evaluated by imaging.\[6\] The presence of respiratory system involvement is often associated with unfavorable outcome.\[6\]

Thus, awareness of imaging manifestations of melioidosis can complement microbiological diagnostic tests for accurate early diagnosis and timely medical and surgical management of melioidosis.

**Conclusion**

F-18 FDG PET/CT has a promising role in initial evaluation of melioidosis, mapping the areas of involvement, thus aiding in early and focused diagnosis. Since the whole body is evaluated, F-18 FDG PET/CT can help in detecting occult and asymptomatic foci of disease. We believe that F-18FDG PET/CT may have a potential role in response evaluation and optimizing duration of antibiotic therapy and thus aiding in personalized management of patients.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initial(s) will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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