

Successful but Cautious Use of FDG-PET Scan in the Evaluation of Fever of Unknown Origin: A Case Report

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Abstract

Fever of unknown origin (FUO) is a challenging condition in the practice of internal medicine. It frequently requires use of complicated tests and applications in the diagnostic workup. We here report a patient presented with FUO who was diagnosed with osteomyelitis by biopsy after a positive Fludeoxyglycose Positron Emission tomography (FDG-PET) scan.

Keywords: FUO; *K. pneumoniae*; Osteomyelitis

Introduction

Fever of unknown origin (FUO) is a challenging condition in the practice of internal medicine [1]. It frequently requires use of complicated tests and applications in the diagnostic workup [2,3]. We here report a patient presented with FUO who was diagnosed with osteomyelitis by biopsy after a positive Fludeoxyglycose Positron Emission tomography (FDG-PET) scan.

Case

A 49-year-old woman was referred to our hospital having experienced daily temperatures of more than 38.5°C for two months. She reported a vaginal bleeding three weeks prior due to the diagnosis of partial hydatidiform mol and had methotrexate therapy. However, this treatment was followed by pancytopenia and high grade fever. Therefore, blood cultures were obtained and they revealed *Klebsiella pneumoniae* colonization.

However, despite appropriate antibiotherapy fever persisted. Then a residual infected mass was thought likely and the patient underwent total hysterectomy and bilateral salpingo oopherectomy. Nevertheless, high grade fever continued with a poor response to antipyretics in the postoperative period. Multiple repeat blood cultures showed no evidence of bacteria.

Then, a thoracic, abdominal and pelvic computed tomography was performed which showed multiple lung nodules and a solitary nodule on the right suprarenal gland, along with hepatomegaly and splenomegaly. Subsequently, the patient underwent a FDG-PET which showed strong activity in both sternoclavicular joints and both humeri but more intense in the right side. Sternum, ribs and sacroiliac joints were also involved.

There was also focal involvements in posterior regions of L3-L4 vertebrae (SUV max: 10.47) and spleen (Figure 1). These new findings were suggestive of multiple metastases. Thus, a biopsy at the right

humerus was immediately performed which was also sent for culture. The pathological examination identified active, chronic osteomyelitis but cultures of the biopsy material showed *Klebsiella pneumoniae* colonization. In accordance with the sensitivity work-up Ertapenem once daily treatment was started.

However, this therapy was switched to Levofloxacin on the second day because of severe, intractable vomiting. On second day of full dose antibiotherapy the fever resolved gradually with significant symptomatic recovery. The patient was discharged with oral Levofloxacin once a day for two weeks more. After three months of her discharge the patient reported no complaint and had no history of fever recurrence. A control FDG-PET imaging was also performed and previously detected involvements were broadly resolved (Figure 2).

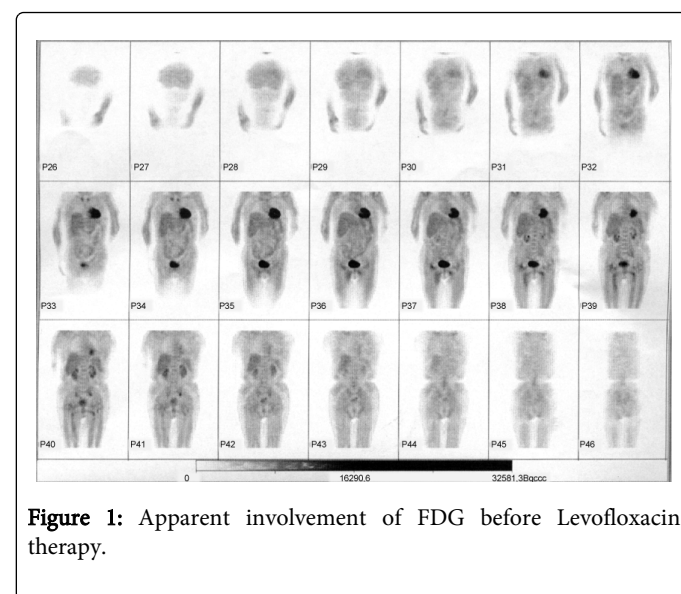


Figure 1: Apparent involvement of FDG before Levofloxacin therapy.

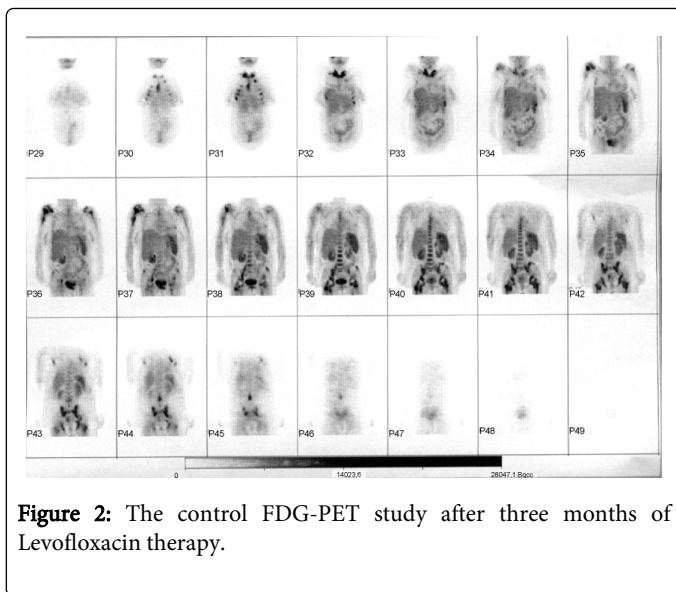


Figure 2: The control FDG-PET study after three months of Levofloxacin therapy.

Discussion

Osteomyelitis is the inflammation of bones and occurs due to infective factors. Patient age, pathway of infection to the bone and presence of comorbidities are important factors in the decision of treatment [4]. The vertebral osteomyelitis comprises about 7% of all bone infections but thoracic and lumbar involvement occurs in 35-50% of all cases [4]. The spread of infection to the bones is usually hematogenous. Urinary tract infections, respiratory tract infections and intravenous drug therapies, diabetes mellitus and cirrhosis are the most common causes of osteomyelitis [4].

Klebsiella pneumoniae is a member of the *Klebsiella* genus and belongs to the normal flora of the human intestine and mouth [5]. It is usually hospital acquired and occurs during systemic illnesses like diabetes and impaired host defenses [5]. The most common presentations are pulmonary infections, bacteremia and intraabdominal infections [5]. Vertebral osteomyelitis and spondylodiscitis due to *Klebsiella Pneumoniae* infection cases have also been reported [4,6]. Quinolones should be considered as the first line therapeutic agents for immune suppressed patients with *Klebsiella* osteomyelitis [7].

Fever of unknown origin (FUO) is a challenging condition in the practice of internal medicine [1] and frequently requires use of complicated tests and applications. The differential diagnosis of FUO is generally categorized into four major groups: infections, malignancies, noninfectious inflammatory disorders, and

miscellaneous [2]. Infections represent about one-fourth of FUO cases, followed by malignancies. Of the infectious diseases that are associated with FUO, tuberculosis and pelvic and abdominal abscesses are the most common pictures. Other common infections that should be considered in patients with FUO include infective endocarditis, sinusitis and osteomyelitis [3].

FDG- PET scan is a screening test for oncologic disorders which has a high sensitivity and specificity [8]. Besides, FDG-PET scan plays an important role in the diagnosis of FUO in the clinical practice [8]. Because glucose transporters are upregulated by the interleukin system [8], in patients with fever, bone marrow uptake of FDG is increased because of nonspecific activation of bone marrow cells, which possibly explain why we detected a widespread involvement in our patient.

Our single observation also suggests that the degree and extent of activity in the skeletal system may be so severe to suggest metastases. Indeed, it is a well-known issue that the FDG-PET scan imaging may reveal positive findings in infective conditions [9]. However, this may cause confusions especially when combined with increased activity in soft tissue as in the case of the present patient. We suggest that the clinicians should consider osteomyelitis whenever FDG-PET scan indicates multiple bone lesions.

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