Necrotizing Cervical Lymphadenitis Caused by *Mycobacterium simiae* in an HIV-Positive Patient: Imaging with ^{18}F -FDG PET/CT

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Abstract *Mycobacterium simiae* (*M. simiae*) is an opportunistic pathogen rarely associated with human disease, although in recent years *M. simiae* has been detected with increasing frequency in human immunodeficiency virus (HIV)-infected patients, usually causing disseminated infection with fever, diarrhea and weight loss. We report the case of an HIV-positive man, who was referred for an ^{18}F -FDG PET/CT to evaluate a solitary pulmonary nodule. The PET/CT showed incidental large necrotic cervical lymph nodes, compatible with necrotizing cervical lymphadenitis. Biopsy and culture of one of the affected lymph nodes were positive for *M. simiae*. We present the first report of ^{18}F -FDG PET/CT imaging of an infectious process caused by *M. simiae* in humans.

Keywords *Mycobacterium simiae* · Necrotizing cervical lymphadenitis · Fluorodeoxyglucose · PET/CT · HIV

Case Report

A 43-year-old HIV-positive man presented with a 2-week history of fevers and sore neck. His blood tests had

shown: absolute CD4 count of 170 cells/ul (normal 420–1,980), absolute CD8 count of 966 cells/ul (normal 160–990), CD4/CD8 ratio 0.20 (normal 1.0–2.3) and WBC 13.3×10^9 (normal $4.0\text{--}11.0 \times 10^9$, 62% neutrophils, 21% lymphocytes, 11% monocytes and 1% eosinophils). A contrast-enhanced CT of the neck showed mildly enlarged bilateral cervical lymph nodes at level 2A, the largest measuring $2.5 \text{ cm} \times 2.0 \text{ cm}$ on the left and $1.6 \text{ cm} \times 1.5 \text{ cm}$ on the right (Fig. 1, arrows). The patient was treated conservatively and sent home.

An ^{18}F -FDG PET/CT (Discovery ST, GE Healthcare, Canada) was done 2 months after the initial presentation to evaluate a solitary pulmonary nodule or consolidation detected on a recent chest radiograph. Maximum intensity projection (MIP) whole-body images did not show any FDG-avid abnormalities in the thorax, but incidentally showed intensely FDG-avid bilateral enlarged cervical lymph nodes measuring 5–6 cm in the greatest diameter (Fig. 2). Transaxial views of the CT portion of the PET/CT confirmed a fluid density in the center of the large photopenic lymph nodes, compatible with a necrotizing lymphadenitis, surrounded by intense ^{18}F -FDG uptake as seen on the PET (Fig. 3b) and PET/CT fusion images (Fig. 3c), with a maximum standardized uptake value (SUV_{max}) of 6.7. Other FDG-avid findings included an additional 1 cm lymph node in the left neck, as well as three right anterior rib fractures overlying the liver. A diagnosis of necrotizing cervical lymphadenitis was proposed, and due to the patient's HIV positivity, an opportunistic pathogen was suggested as a possible etiological agent. ^{18}F -FDG PET/CT ruled out the possibility of disseminated infection or any other focus of infection in the rest of the body. Biopsy and culture of one of the necrotic lymph nodes was positive for *M. simiae*, and the patient was started on antibiotics and promptly treated with surgical excision of the affected lymph nodes.

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Fig. 1 A contrast-enhanced CT of the neck of a 43-year-old HIV-positive man, who presented with fever and sore neck of 2-week duration, showed bilateral mildly enlarged cervical level 2A lymph nodes, the largest measuring 2.5 cm×2.0 cm on the left and 1.6 cm×1.5 cm on the right (arrows)

Discussion

Mycobacterium simiae is a non-tuberculous acid-fast bacillus found in soil, salt, fresh water, foodstuffs and even air samples. It is a very rare but known cause of necrotizing cervical lymphadenitis in immunocompromised hosts, and has been detected with increasing frequency in recent years in HIV-infected patients [1, 2]. Prompt diagnosis and therapy are necessary, as necrotizing cervical lymphadenitis is severely destructive, and a delay in lymph node excision can result in very extensive spread and uncontrollable adjacent soft tissue damage. Treatment includes surgical excision of the involved nodes and a course of antibiotics, although *M. simiae* is the most drug-resistant of all non-tuberculous mycobacteria, requiring combination therapy [1].

Fig. 2 ^{18}F -FDG PET/CT maximum intensity projection (MIP) images with (a) anterior and (b) left lateral views, done 2 months after the initial presentation for the evaluation of a solitary lung nodule, showed bilateral large necrotic lymph nodes in the neck and three right lower rib fractures

^{18}F -FDG PET/CT is proving to be a valuable tool for detecting and localizing various infectious disease processes in immunocompetent [3–6] as well as immunocompromised patients [7–12]. The role of ^{18}F -FDG PET/CT imaging in HIV patients continues to be investigated [7, 8]; however, initial results for detecting HIV-related infections and malignancies are promising. Positive ^{18}F -FDG uptake in mycobacterial infections in immunocompromised hosts has been described for such mycobacterial species as: *Mycobacterium tuberculosis*, *Mycobacterium avium intracellulare*, *Mycobacterium kansasii* and *Mycobacterium xenopi* [9–12]. To our knowledge, this is the first report of ^{18}F -FDG PET/CT imaging of an infection caused by *M. simiae* in a human patient.

^{18}F -FDG PET/CT cannot differentiate among the different causes of necrotizing cervical lymphadenitis, which can be caused by different bacteria, including *Mycobacterium tuberculosis*, *Mycobacterium avium intracellulare*, *Histoplasma capsulatum*, *Coccidioides immitis*, *Bartonella henselae*, *Francisella tularensis*, *Chlamydia trachomatis* L2, *Yersinia pseudotuberculosis* and *Yersinia enterocolitica*; and non-bacterial causes such as viral pathogens (e.g., Herpes simplex, Parvovirus B19) [13–15], lymphoma, metastatic carcinoma [15] and Kikuchi disease [16–18]. However, in this case, the PET/CT whole-body scan was very helpful in identifying multiple sites of infection within the neck, in ruling out disseminated infection or infectious foci outside the neck, and in guiding biopsy and subsequent therapy.

In conclusion, the variety of indications for ^{18}F -FDG PET/CT imaging for the evaluation of infectious disease processes continues to expand at a rapid pace. PET/CT readers need to be aware of emerging pathogens such as *M. simiae* and the imaging appearance of the infectious processes they can cause. Specialists in infectious diseases and internal medicine should be aware of the potential of ^{18}F -FDG PET/CT imaging as an emerging diagnostic

Fig. 3 Transaxial views of (a) CT portion of the PET/CT, (b) PET and (c) PET/CT fusion images

modality that may become very useful in helping to manage such difficult cases.

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