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Fluorine-18 labeled fluorodeoxyglucose positron emission tomography/computed tomography of cat scratch disease: a case report

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► ***Case report***

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ABSTRACT

Natural Cat scratch disease is caused by the infection of Bartonella henselae after a cat scratch, bite, or close contact, and mainly presents with skin lesions and swollen lymph nodes in the drainage area. Herein, we report a 71-year-old female cat scratch disease patient who initially presented with low fever and enlarged lymph nodes on the left side of her neck, who underwent fluorine-18 labeled fluorodeoxyglucose positron emission tomography/computed tomography for suspected lymphoma. As increased fluorodeoxyglucose uptake can indicate inflammation or tumor, and lymph node enlargement accompanied by abnormal metabolism can mimic lymphoma or other diseases, the diagnosis of cat scratch disease is difficult. Its diagnosis should be indicated when unilateral lymphadenopathy is accompanied by abnormally high metabolic uptake of fluorodeoxyglucose.

INTRODUCTION

Cat scratch disease (CSD) is a self-limiting acute/subacute infectious disease caused by cat bites or scratches [1]. CSD is characterized by draining chronic granulomatous lymphadenitis, and is also known as benign lymphocytosis [2]. CSD occurs globally, and approximately 6.6 out of every 100,000 people are infected with the disease [3]. Recently, with the improvement of living standards, the number of people who keep pets has increased, as has the incidence of this disease. CSD mainly occurs in children, and the incidence in the elderly is relatively low [4]. The clinical and imaging signs of CSD are not specific, and it is difficult to obtain a correct diagnosis without histopathological results. Herein, we report an elderly female CSD patient who underwent fluorine-18 labeled fluorodeoxyglucose (18F-FDG) positron emission tomography/computed tomography (PET/CT) for suspected lymphoma.

Case presentation

A 70-year-old woman visited our hospital with a low-grade fever and a mass on her neck that had been present for half a year, and which had gradually enlarged in the past week. Physical examination revealed multiple hard, movable masses on the left side of the neck with tenderness but no redness or swelling. The results of blood and tumor marker tests revealed all indicators within normal range. The patient underwent ultrasonography and multiple heterogeneous echoic masses in the neck with unclear boundaries and irregular shapes were found, with septal bands and small dense spots moving within. They were poorly demarcated from the left sternocleidomastoid muscle. Color Doppler flow imaging (CDFI) (Logic E9, GE Healthcare, USA) showed some strip-shaped blood flow signals in the soft tissue nodules. The patient subsequently underwent 18F-FDG PET/CT (Biograph mCT, Siemens, Germany). The injection dose was 8.5 mCi (0.15 mCi/kg) (figure 1A). Clinicians suspected lymphoma and the results showed multiple lymphadenopathies in the neck (II, III, IV, V), and the left supraclavicular fossa showed 18F-FDG uptake (partially clustered) with a maximum standard uptake value (SUVmax) of 19.5. Additionally, multiple lymph nodes with FDG uptake were observed in the mediastinum, SUVmax=9.4. The major axis of the largest lymph node was approximately 3.0 cm. A pathological biopsy (Hematoxylin-eosin staining reagent, MXB Biotechnologies, Fuzhou, China) was performed and the results revealed granulomatous inflammation with microabscess formation in the center, suggesting CSD.

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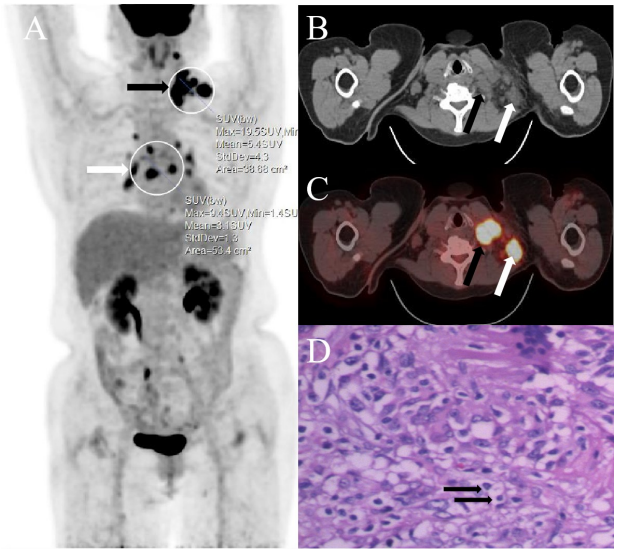

Figure 1. (A) The maximum intensity projection image of ^{18}F-FDG PET/CT, showing abnormally high metabolic uptake of fluorodeoxyglucose (FDG) in the left side of the neck and supraclavicular fossa, maximum standard uptake value (SUVmax)=19.5. **(B)** Axial CT image, showing enlarged lymph nodes in the neck (black arrow) and supraclavicular fossa (white arrow) with rough edges. **(C)** PET/CT fusion images, showing abnormally high metabolic uptake of FDG in the areas corresponding to figure 1B. **(D)** Hematoxylin-eosin staining demonstrates diffuse microabscess formation in the lesion (200 times magnification, see arrows).

DISCUSSION

Cat scratch disease (CSD) is a zoonotic infection from a Gram-negative bacterium, Bartonella henselae [2]. Cats are carriers of the bacterium and humans can be infected through prolonged close contact or through cat bites or scratches [5]. CSD patients usually present with painless lymph node enlargement in the drainage area of the injury. The enlarged lymph nodes usually appear in the elbow, armpit, neck, popliteal fossa, or groin [5, 6]. Some CSD patients may have non-specific clinical signs such as low fever and local skin damage.

Our patient initially presented with enlarged lymph nodes in the neck and a low fever, therefore the clinician suspected lymphoma and requested PET/CT. Since most CSD patients initially present with superficial lymph node enlargement, ultrasound of superficial tissue is the usual imaging method. Generally, B-scan ultrasonography shows the lesion as an ill-defined mixed echo area, with a dark area of microabscess in the center, and CDFI shows a small amount of blood flow signal in the soft tissue nodules [7]. CSD lymphadenitis presents as round/oval soft tissue nodules on CT, with clear boundaries and low-density foci in the lesions' centers [8]. Compared with the muscles of the same plane, enlarged lymph nodes show equal or slightly higher signal on T1-weighted imaging, high signal on T2-weighted imaging, and the central abscess area showed long T1 and T2 signal changes. Contrast-enhanced CT and magnetic resonance imaging show moderate homogeneous or annular enhancement of the lymph nodes [9].

To our knowledge, there are few reports on the application of 18F-FDG PET/CT in CSD diagnosis globally [6, 10, 11]. Both imaging in literature reports and our patient's PET/CT showed multiple soft tissue masses with abnormally high metabolic uptake, suggesting that glucose metabolism is relatively active in the disease. CSD of the neck should be differentiated from lymphoma, metastatic tumor, lymph node tuberculosis and Castleman's disease according to these characteristics. Lymphoma is usually extensive in scope and can be clearly shown on 18F-FDG PET/CT [12], where the primary lesion can typically be found, and diagnosis is not difficult. Lymph node tuberculosis is often associated with weight loss, fatigue, and other tuberculosis symptoms. As the disease progresses, calcification develops in the lesion. PET/CT can accurately locate and identify lymph node lesions in CSD patients, as 18F-FDG is slightly taken up by diseased lymph nodes [13]. However, the correct diagnosis rate of CSD is still very low. According to literature reports, almost all CSD patients were misdiagnosed as lymphoma, lymph node tuberculosis or viral lymphadenitis before surgery or biopsy [14]. A history of cat scratches, bites, or close contact is the key to the correct diagnosis of CSD. The pathological signs are chronic inflammatory granulomas of the lymph nodes with formation of microabscesses, and a positive etiological examination [2]. CSD is usually self-limited and lasts fewer than 3 months. Antibiotics such as azithromycin and erythromycin are effective in treating the disease. When the infection is antibiotic resistant, the diseased lymph nodes can be surgically removed.

In conclusion, 18F-FDG PET/CT is problematic in the diagnosis of CSD. Our case and others revealed that identifying unilateral single or multiple lymphadenopathies with abnormally high metabolic uptake of 18F-FDG may be a breakthrough in CSD diagnosis, which should be confirmed in future large-sample studies.

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