

Mycosis fungoides staged by ¹⁸F-fluorodeoxyglucose positron emission tomography/computed tomography

Case report and review of literature

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Abstract

Introduction: Mycosis fungoides is a kind of malignant lymphoma arising from T cells, but primarily occurs in skin, and it is the most common type of cutaneous lymphoma. Mycosis fungoides (MF) is a rare non-Hodgkin lymphoma but the most common type of primary cutaneous T-cell lymphomas. Because of unknown etiology and mechanism, and lack of typical clinical and histophysiological manifestations, the final diagnosis of MF is currently dependent on pathology and immunohistochemistry. Subsequently, tumor staging is very important. Different approaches would be taken according to varying degrees of cutaneous and extracutaneous lesions. Computed tomography (CT) scan has been chosen to stage tumors customarily. However, CT could only provide morphological information and analyze lymphadenopathy by the size criteria. ¹⁸F-fluorodeoxyglucose positron emission tomography/computed tomography (PET/CT) could provide morphological information and metabolic conditions simultaneously, which is helpful to locate and stage lesion.

Conclusion: ¹⁸F-fluorodeoxyglucose PET/CT could identify cutaneous and extracutaneous lesions in patients with MF. It could provide the range of lesions and biopsy target.

Abbreviations: ¹⁸F-FDG = fluorine-18-fluorodeoxyglucose, CT = computed tomography, MF = mycosis fungoides, NHL = non-Hodgkin lymphoma, PET/CT = position emission tomography/computed tomography, SUVmax = the maximal standardized uptake value.

Keywords: ¹⁸F-FDG, mycosis fungoides, PET/CT, tumor staging

1. Introduction

Mycosis fungoides (MF) is a primary cutaneous non-Hodgkin lymphoma (NHL) of T-cell origin and relatively rare disease that occurred in 0.36 per 100,000 annually.^[1] MF could affect cutaneous spread and extracutaneous spread that might involve lymph nodes, skeletal sites, peripheral blood, and viscera. The staging of cutaneous spread and extracutaneous involvement has imperative implications on patient therapeutic plan

and prognosis.^[2] ¹⁸F-fluorodeoxyglucose positron emission tomography/computed tomography (PET/CT) has been used to evaluate stage and prognosis for variety of lymphomas.^[3] Only few case reports and investigations assess the potential role of PET/CT in diagnosing and staging primary cutaneous lymphomas including MF.^[4] Fluorodeoxyglucose (FDG) is the most commonly used positron tracer at present, and its uptake in the malignant tumor is increasing evidently. The lesions in the early stage of MF absorb FDG slightly. It could be helpful to locate the lesion which need biopsy. Cutaneous and extracutaneous lesions in the advanced stage of MF are both FDG high uptake. We present a case of MF that was staged by ¹⁸F-fluorodeoxyglucose PET/CT, and the related literature are reviewed.

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2. Case report

2.1. Patient information

A 62-year-old female patient was admitted to our institution on April 01, 2015 for dozens of plaques that gradually appeared on the skin of face, chest and back, upper limbs, and bilateral thigh within a year. In addition, she had a 30-year history of multiple pruritic patches on the skin all over the body.

2.2. Clinical findings

The patient's vital signs were stable at admission, and physical examination showed patches and plaques symmetrically distributed on the skin of face, trunk, upper limbs, and bilateral thigh. The maximum size of plaques was about 6 × 6 cm².

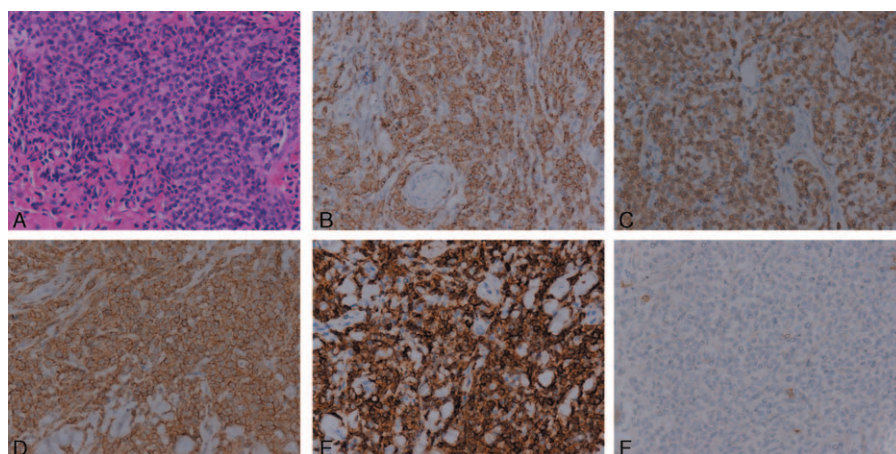


Figure 1. Magnification 10 × 20. (A) HE: the presence of interstitial infiltration of lymphoid cells with stained cytoplasm and nuclear and pathological mitotic figure. (B) CD2(+), (C) CD3(+), (D) CD4(+), (E) CD5(+), and (F) CD8(−). HE = Hematoxylin-eosin staining.

2.3. Diagnostic focus and assessment

After providing informed consent, a biopsy of a cutaneous lesion on patient’s left forearm was performed. On histopathology, interstitial

infiltration of lymphoid cells with stained cytoplasm and nuclear, and pathological mitotic figure could be presented (Fig. 1A). Immunohistochemistry showed that the dermis cells expressed CD2, CD3, CD4, and CD5 (Fig. 1B–E). The diagnosis of MF was

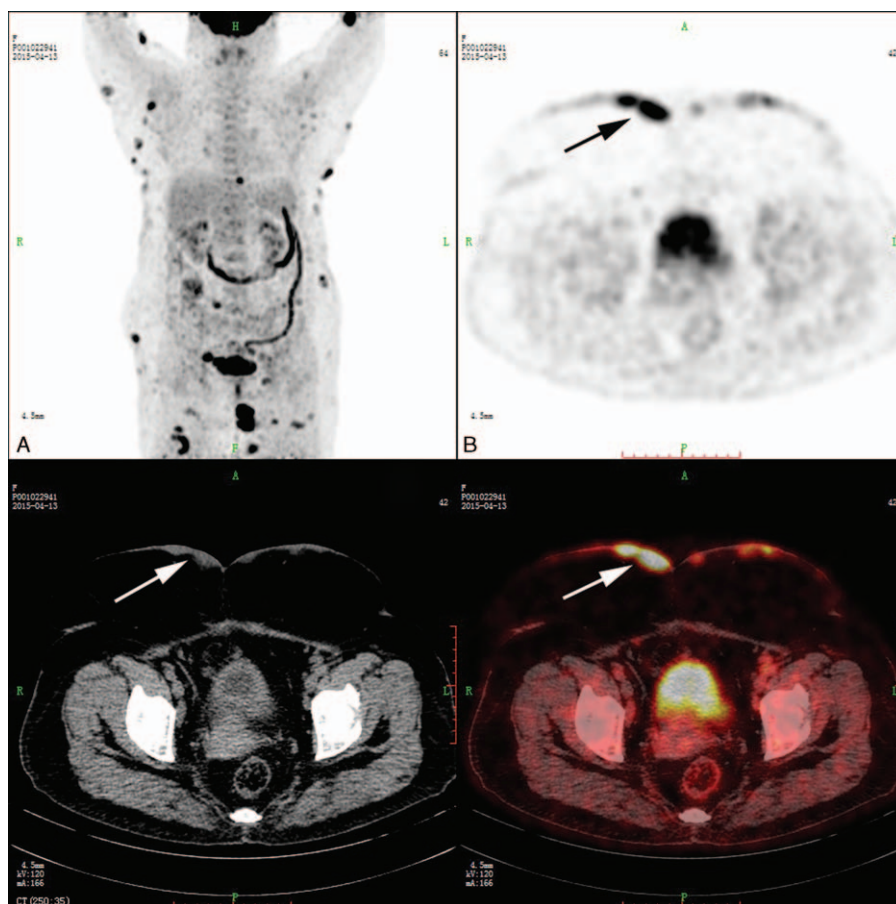


Figure 2. (A) Whole-body maximum-intensity projection fluorine-18-fluorodeoxyglucose (¹⁸F-FDG) position emission tomography (PET) image: increased ¹⁸F-FDG uptake noted at multiple cutaneous and extracutaneous lesions. (B) Axial PET, computed tomography, and fused position emission tomography/computed tomography images: a significantly increased flurodeoxyglucose uptake in the right hypogastric cutaneous lesions (arrows). The maximal standardized uptake value of the cutaneous lesions was 12.9.

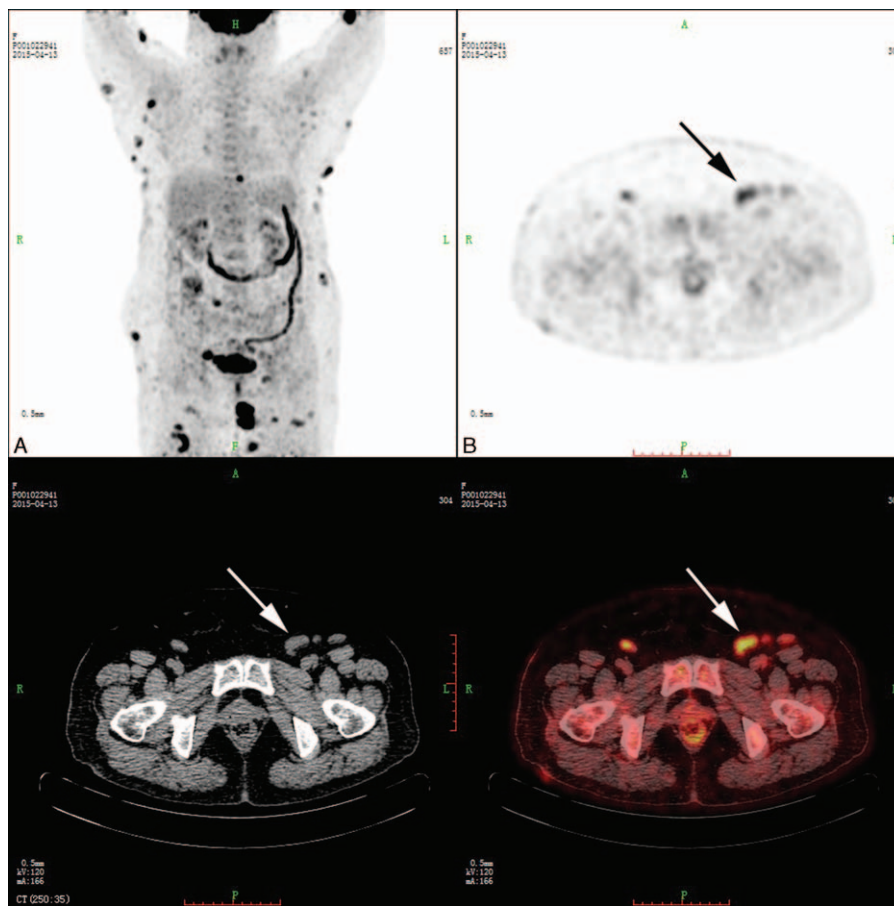


Figure 3. (A) Same as Fig. 2A. (B) Axial position emission tomography, computed tomography, and fused position emission tomography/computed tomography images: a significantly increased fludeoxyglucose uptake in the left inguinal lymphonode (arrows). The maximal standardized uptake value of the inguinal lymphonode lesion was 5.7.

confirmed on these biopsies. In order to clarify how much cutaneous spread and extracutaneous organs MF involving, the patient was suggested to undergo a whole-body fluorine-18-fluorodeoxyglucose (^{18}F -FDG) PET/CT scan. ^{18}F -FDG PET/CT (Figs. 2 and 3) revealed increased FDG uptake in disseminated cutaneous plaques in the right side of frontal region, left upper antibrachium, right cervix, trunk, bilateral thigh, together with axillary and inguinal lymphonode involvement. The maximal standardized uptake value (SUVmax) of the cutaneous lesions was 12.9. The maximal SUV of the axillary and inguinal lymphonode was 5.7. The cutaneous plaques violated the subcutaneous tissue but no inferior muscle. ^{18}F -FDG PET/CT image revealed the depth of invasion of the lesions which were invisible in clinical physical examination and CT scan.

2.4. Therapeutic intervention and follow-up

Subsequently, the patient was referred for 2 cycles chemotherapy with CHOP-L (Vindesine [Hangzhou Minsheng Pharmaceutical Group Company, HangZhou City, ZheJiang Province, China] 4 mg Day1 + Cyclophosphamide [Baxter Oncology GmbH, Glenview, Illinois, USA] 1 g Day1 + Epirubicin [Pfizer pharmaceutical company, New York, USA] 100 mg Day1 + L-asparaginase [Kyowa Hakko Kogyo Co Ltd, Tokyo, Japan] 10,000 IU Day1–7 + Dexone [Guangzhou Baiyunshan Tianxin Pharmaceutical Co Ltd, GuangZhou City, GuangDong Province, China] 20 mg Day1–5). The cutaneous lesions retreated but then reproduced more than

before. The patient was subsequently referred for 1 cycle chemotherapy with hyper-CVAD-B (Methylaminopterin [Pfizer pharmaceutical company, New York, USA] 3 g Day1 + Cytosine arabinoside [Actavis Pharmaceutical Group Company, Jersey, USA] 1.5g Day2–3). The cutaneous lesions retreated but then reproduced more than before again. The patient was then referred for 5 cycles chemotherapy with DHAP (Cis-platinum [Qilu Pharmaceutical Group Company, Jinan City, ShanDong Province, China] 160 mg Day1 + Cytosine arabinoside 4g Day2 + Dexone 40 mg Day1–4). The interval of each chemotherapeutic cycle was about 3 weeks. Also, interferon, laser radiation, and antihistaminics (levocetirizine and ketotifen) were added to control cutaneous lesions and pruritus during all the treatment. After 8 cycles chemotherapy, there was not a obvious progression in the overall extent of cutaneous lesions by visual inspection. Repeat ^{18}F -FDG PET/CT was delayed for postchemotherapy hematological systemic suppression.

3. Discussion

MF is a rare NHL but is the most frequent type of T-cell lymphomas that primarily involve the skin. It is featured by a characteristic long course of disease and T-cell malignant proliferation. Patches, infiltrated plaques, and tumors are 3 classical clinical cutaneous phases of MF which have been reported.^[5] Any of these 3 phases could be the initial symptom. In

addition, these 3 phases could commonly overlap or occur simultaneously.^[6] Thus, MF is not easy to confirm, mainly due to the atypical clinical manifestations at a prime stage.^[7] The cutaneous extension and skin involvement phase and whether involving extracutaneous lymphnode or organs are related with prognosis,^[8] so accurate staging is imperative for prognosis and to help formulate appropriate treatment selections.^[9] As a conventional imaging examination approach, computed tomography (CT) scan has been used to stage variety of tumors by the size criteria and only morphological information.^[10] Normalized lymphnodes involved by MF are easy to be missed by CT scans, and enlarged nonspecific inflammatory reactive lymphnodes are easy to be misdiagnosed.^[11] Only few case reports mentioned the potential role of ¹⁸F-FDG PET/CT in diagnosing primary cutaneous lymphomas such as MF.^[7,12] ¹⁸F-FDG PET/CT has been reported to have better sensitivity and specificity than CT alone. It may reveal the metabolism of lesions based on SUVmax. Combined with morphologic information provided by CT, ¹⁸F-FDG PET/CT could provide more valuable information for the diagnosis and staging of MF. In addition, ¹⁸F-FDG PET/CT could provide a definitive localization of metabolic activity within specific lesions.^[13] However, cutaneous lymphomas with some chronic skin diseases such as dermatopathic lymphadenitis could take high value ¹⁸F-FDG has been reported.^[14]

4. Conclusion

In conclusion, ¹⁸F-FDG PET/CT could identify cutaneous and extracutaneous lesions in patients with MF. Although ¹⁸F-FDG PET/CT could not routinely define all cutaneous and extracutaneous lesions, it could be a sensitive, accurate, valuable imaging approach for diagnosis and therapy plans, especially staging.

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