Flip-flop phenomenon in systemic sclerosis on fluorodeoxyglucose positron emission tomography/computed tomography

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ABSTRACT

Systemic sclerosis (SSc) is a rare autoimmune disease, which may affect multiple organ systems. Fluorine-18-fluorodeoxyglucose (18F-FDG) positron emission tomography/computed tomography (PET/CT) can demonstrate the degree and anatomical extent of involvement in the entire body and coexisting malignancies in connective tissue diseases. We present a case of SSc with an increased 18F-FDG uptake in the cutaneous and subcutaneous tissues even higher than the neighboring skeletal muscles ("flip-flop phenomenon," that is, an increased 18F-FDG uptake in the skin but a decreased 18F-FDG uptake in the skeletal muscles).

Keywords: Fluorine-18-fluorodeoxyglucose, positron emission tomography/computed tomography, systemic sclerosis

A 55-year-old male was presented with digital ulcers, exertional dyspnea intermittent attacks of diarrhea. He was diagnosed as systemic sclerosis (SSc) with the findings of the 1-year duration of Raynaud phenomenon, typical fibrotic skin changes, anti-nuclear antibody = 1/320, and anti-Scl-70 positivity. He had bibasilar rales, and initial thorax high-resolution computed tomography (CT) evaluation of the chest revealed bilateral ground glass attenuation along with an 8 mm spiculated nodule at the right middle lobe of the lung in the ex-smoker patient. Positron emission tomography/CT (PET/CT) was performed for excluding coexisting malignancy. Fluorine-18-fluorodeoxyglucose (18F-FDG) PET/CT demonstrated rarely seen diffuse skin uptake that was interpreted as a technical artifact at the initial scan and the scan was repeated 2 days later. There was no pathological 18F-FDG uptake in the lung nodule. A mild 18F-FDG uptake (SUVmax: 2.8) was seen in the lung lesions suggestive for infection/inflammation [Figure 1a]. Interestingly, an increased 18F-FDG uptake arrows, (SUVmax: 1.1) even higher than the neighboring skeletal muscles was observed in the cutaneous and subcutaneous tissues, which were prominently revealed in gluteal region [Figure 1b, arrows]. After the exclusion of malignancy while he was planned to receive cyclophosphamide, intestinal pseudo-obstruction, persistent attacks of bradycardia, and asystole were developed. The patient died despite all supportive measures, 1-month after diagnosis of SSc.

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Fluorine-18-fluorodeoxyglucose PET/CT demonstrated skin involvement and interstitial lung disease and excluded coexisting malignancy in this patient. 18F-FDG PET/CT is a promising imaging modality for detecting coexistent neoplastic disease and other autoimmune disorders.[1] The associated neoplasms with SSc include breast and lung cancer.[2,3] Many causes of cutaneous 18F-FDG uptake have been described before in various malignant disorders including malignant melanoma, skin lymphomas, and Kaposi sarcoma, etc.[4,5] It has been also reported in benign tumors or lesions such as psoriasis, cutaneous and subcutaneous sarcoidosis, Sweet syndrome, etc.[6-8] However, cutaneous 18F-FDG uptake has not yet been reported in SSc with skin involvement. In this patient with diffuse SSc, flip-flop phenomenon (i.e., an increased 18F-FDG uptake in the skin but a decreased 18F-FDG uptake in the skeletal muscles) can be explained by the thickening of cutaneous tissue and muscle atrophy. Extracellular matrix overproduction by activated fibroblasts and interactions among endothelial and inflammatory

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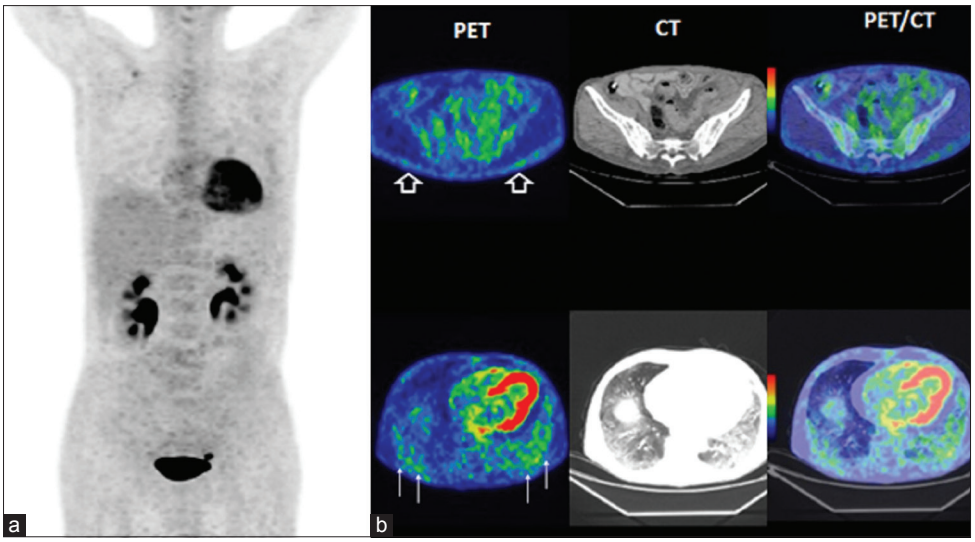

Figure 1: (a) Maximum intensity projection reconstruction of CT attenuation-corrected PET image data shows diffuse increased skin FDG uptake. (b) Mild FDG uptake in the inflammatory lung lesions and increased FDG uptake in the cutaneous and subcutaneous tissue higher than the neighbouring skeletal muscles are seen.

cells may be responsible for the observed hypermetabolism in the skin.

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