Metabolic Super Scan in ¹⁸F-FDG PET/CT Imaging

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CASE REPORT

INTRODUCTION

The “super scan” of bone scintigraphy is defined as a bone image that “looks too good.” Its characteristics include intense activity in the bones and diminished renal parenchymal activity (1). Su et al. (2) had reported the case of ¹⁸F-fluorodeoxyglucose positron emission tomography (FDG PET) super scan involving skeletons, similar to the super scan of bone scintigraphy. A “hepatic super scan” by FDG PET has been reported in a patient with Hodgkin disease who had unusually elevated hepatic radioactivity, in addition to the multiple areas of focal uptake in the chest, mediastinal, left axillary, and abdominal lymph nodes, and the adrenal glands. A liver biopsy demonstrated diffuse hepatic involvement (3). Here we report a case of ¹⁸F-FDG PET/CT super scan showing extensive hypermetabolic lesions throughout the skeleton and liver. Contrary to the intense hypermetabolism of skeletons and liver, the skeletal muscles of limbs, mediastinum, bowel, and especially brain showed very low FDG uptake.

The patient’s mental status was clear and he underwent ¹⁸F-FDG PET/CT (Biograph Sensation 16, Siemens Medical Systems, USA) for staging of lung malignancy, 1 hr after injection of 444 MBq (12 mCi) ¹⁸F-FDG. ¹⁸F-FDG PET/CT demonstrated focal hypermetabolic lung mass in left lower lobe with diffuse and intense hypermetabolism throughout the skeleton and liver. Interestingly, skeletal muscles of limbs, mediastinum, bowel, and especially brain showed very low FDG uptake (Fig. 1). This patient had no medications could disturb cerebral glucose metabolisms, such as corticosteroids and sedatives.

DISCUSSION

A super scan is well-known phenomenon which is characterized by a strikingly high bone to soft tissue ratio on skeletal scintigraphy, with a uniform symmetrical increase in bone uptake and absent renal visualization (4). The super scan is associated with various malignancies, and most commonly in carcinomas of the prostate, stomach and breast (5). Metastasis from lung cancer rarely causes a super scan, although multiple bone metastases or bone marrow involvement frequently occur in patients with lung cancer (6). Sy et al. (7) hypothesized that the increased uptake of radiopharmaceutical by diseased bone results in reduced phosphate excretion, thereby producing faint renal images in the bone scintigraphy.

This case had some characteristics in common with super scan on skeletal scintigraphy. First, even though this is not uncommon feature in patients with extensive metastasis, intense and diffuse hypermetabolism throughout the skeleton and liver...
was demonstrated. The similar findings had reported in other cases of FDG PET super scan, however, this case had shown the best contrast between metastatic organs and non-metastatic organs (2, 3, 8). Second, FDG uptakes in skeletal muscles of limbs, mediastinum, bowel, and especially brain were remarkably low and this is the unique characteristic of the present case. The faint visualization of the brain, renal cortex, and soft tissue might be the result of extraordinarily high uptake of FDG by bony and hepatic metastatic lesions. Low brain uptake of FDG has been reported when using corticosteroids and sedatives, and these conditions should be taken into consideration (9, 10). The present patient had no medications could disturb cerebral glucose metabolisms, such as corticosteroids and sedatives. Because of some characteristics in common with super scan on skeletal scintigraphy, this case could be considered as ‘metabolic super scan’.

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