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Neurofibroma with increased uptake of [F-18]-fluoro-2 deoxy-D-glucose interpreted as a metastatic lesion

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We report a patient with a solitary spinal neurofibroma in the posterior mediastinum interpreted as a metastatic tumor.

A 46-year-old female with rectal cancer who had undergone operation and subsequent adjuvant chemotherapy two years previously was referred to our department for a follow-up whole body FDG-PET study. PET scan revealed a mass with increased uptake of FDG (SUV = 4.6) in the posterior mediastinum. MRI examination showed a dumbbell neurogenic tumor originating from the intercostal nerve at T6 level. A subsequent CT-guided biopsy demonstrated a neurofibroma.

Key words: neurofibroma, FDG, PET

INTRODUCTION

[F-18]-fluoro-2 deoxy-D-glucose (FDG) in conjunction with positron emission tomography (PET) is a novel modality for tumor detection, staging, therapeutic monitoring and follow-up studies. Its non-specificity remains a difficulty in differentiating malignant from benign pathological variants, which occasionally mimic that of malignancy.[1]

Neurofibroma is a benign and heterogeneous tumor arising from the connective tissue of peripheral nerve sheath that occurs as an isolated sporadic lesion or in multiple forms encountered in neurofibromatosis type 1 (NF1).[2] Malignant transformation is rare, occurring in 2–5% of NF1 individuals with plexiform neurofibroma.[1] In children with NF1, spinal neurofibroma was observed in 13.2%.[3]

CASE REPORT

A 46-year-old asymptomatic female with rectal cancer who had received operation and subsequent adjuvant chemotherapy two years previously was referred to our department for a follow-up whole body FDG-PET study.

FDG-PET imaging was performed at 60 minutes after intravenous injection of 355 MBq (9.6 mCi) of 2-^{18}F-fluoro-2-deoxy-D-glucose (FDG) on a Siemens ACCEL PET scanner. Imaging was reconstructed iteratively with attenuation correction. The images showed a 3-cm-diameter mass with increased uptake of FDG in the posterior mediastinum adjacent to vertebra, extending from the middle to inferior mediastinum. The maximal SUV of the lesion was 4.6, suggesting a malignant tumor (Fig. 1).

Chest X-ray showed a mass in the peri-hilar region of the right lung. Magnetic resonance imaging (MRI) revealed an elongated low T1W and high T2W signal mass widening the right T6 intervertebral foramen and extending through the foramen into the paraspinal soft tissues to T9 level. Homogeneous contrast enhancement of the mass was noted on the post-Gd images. The spine and spinal cord were intact. A neurogenic tumor, likely dumbbell spinal neurofibroma was thought to be the most likely diagnosis (Fig. 2).

Computed tomography (CT)-guided biopsy was performed for tissue confirmation. Three tissue fragments measuring about 1.0 × 0.1 × 0.1 cm in size were obtained. Grossly, the specimens were yellowish, soft, and cord-like. Microscopically, proliferative spindle cells with wavy nuclei in fascicles were noted. The diagnosis of neurofibroma was made (Fig. 3). No evidence of malignant change was present in the biopsied specimens.

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DISCUSSION

PET is a relatively new imaging modality in clinical medicine. One of the roles of FDG-PET is to discriminate benign from malignant neoplasms. Normal physiological and benign pathological variants have occasionally been found during the task of cancer detection, most of which are inflammatory processes.[1,4,5] Quantitative analysis of tracer uptake provided complementary information to visual image interpretation and objective criteria to increase the specificity of diagnosis. Calculation of the standard uptake value (SUV) has usually been used. Although no full consensus has been reached, an SUV of 2.5 has been utilized as the cutoff level for differentiating malignant from benign pulmonary lesions.[6–8] A meta-analysis of FDG-PET for the diagnosis and grading of soft-tissue sarcoma was reported.[9] The SUV seemed helpful. However, there has been considerable overlap between malignancy and benign.[9–11]

Benign neurogenic tumors, neurofibroma or schwannoma, have been reported to show glucose hypermetabolism.[9,12–14] Ferner et al. reported increased FDG uptake in most neurofibromas undergoing malignant change. Using 2.5 as a SUV cut off, there was only one false positive in eighteen NF1 patients.[15] However, an overlap between benign and malignant lesions between 2.7 and 3.3 was found. Solomon et al. reported that FDG-PET was a useful

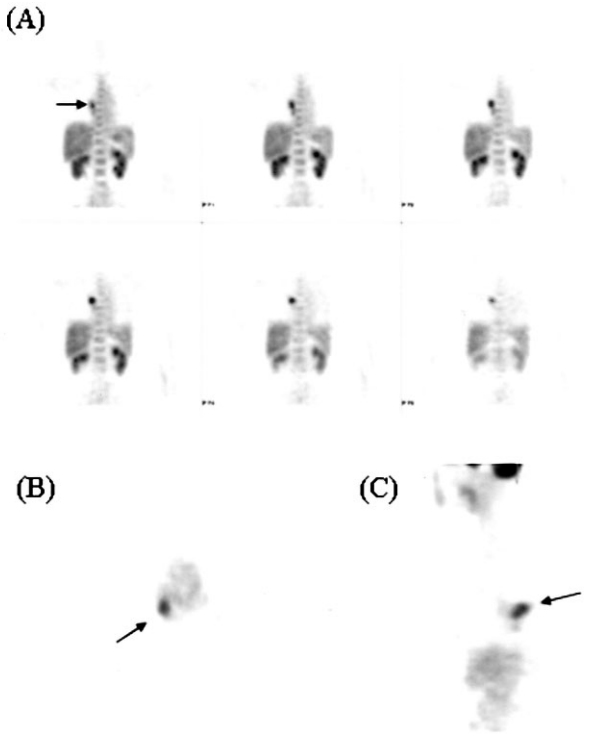

Fig. 1 (A) Coronal, (B) Transaxial and (C) Sagittal views show a 3-cm-diameter mass with intense uptake of FDG in the posterior mediastinum adjacent to vertebra, extending from middle to inferior mediastinum. The maximal SUV of the lesion is 4.6.

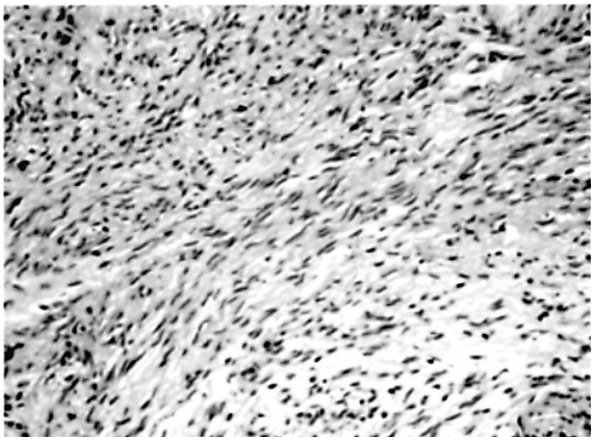

Fig. 3 Microscopically, proliferative spindle cells with wavy nuclei in fascicles were shown.

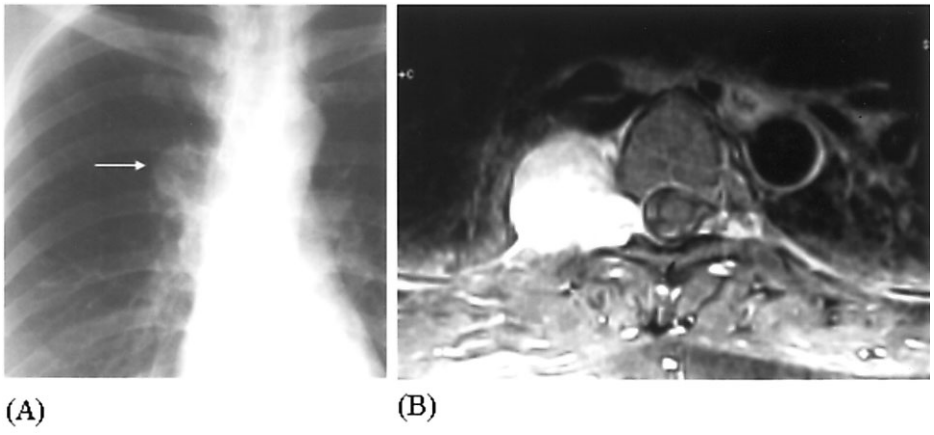

Fig. 2 (A) Chest X-ray shows a mass at peri-hilar region of right lung. (B) The axial T1W enhanced MRI reveals a well-defined mass widening the right T6 intervertebral foramen and extending through the foramen into the paraspinal soft tissues. There is homogeneous enhancement with gadolinium.

tool for detecting sarcomatous transformation of neurofibroma.[16]

The tumor in this case was judged to be benign both clinically and histologically. However, it was initially interpreted as a metastatic lesion due to its increased FDG uptake. Whether the tumor was in the process of undergoing malignant transformation or a small piece of tissue obtained by CT-guide biopsy is unreliable for differentiation with high error rates as great as 18% for tissue sarcoma in general,[16] remains to be clarified.

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