PET SCANNING MAY NOT DISTINGUISH BENIGN SCHWANNOMA FROM METASTASIS IN A PATIENT WITH LUNG ADENOCARCINOMA

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ABSTRACT

A 69-year-old man was diagnosed with lung adenocarcinoma with metastasis because two masses in the right intercostal space and right back muscle showed high accumulation on positron emission tomography (PET). The 6-month treatment with osimertinib significantly reduced his lung lesion, but no changes were observed in the metastatic lesions. Needle biopsy revealed that the lesion in the right back muscle was a schwannoma. Surgical resection revealed that the right intercostal lesion was also a schwannoma; subsequently, a right upper lobectomy was performed. The patient was finally diagnosed with lung adenocarcinoma without metastasis. High accumulations of lesions observed on PET may indicate schwannomas.

KEYWORDS

Lung adenocarcinoma, schwannoma, positron emission tomography, biopsy

LEARNING POINTS

- Benign schwannomas could show high accumulations on positron emission tomography.
- Accurate diagnosis of schwannoma using only images is quite challenging.
- Histological examinations should be considered when asymptomatic lesions are suspected to be metastases.

INTRODUCTION

Positron emission tomography (PET) is an indispensable imaging tool for lung cancer staging. A meta-analysis of 780 patients with lung cancer showed that the combined use of PET and computed tomography (CT) had a very high accuracy for detecting metastasis, with sensitivity of 92% and specificity of 97%[1]. Therefore, PET-CT is recommended for lung cancer staging[2]. Here, we present a case of lung adenocarcinoma with benign schwannomas misdiagnosed as metastases on PET-CT.

CASE PRESENTATION

A 69-year-old man presented at our hospital with chest radiographic abnormalities, but he did not have any symptoms such as cough, sputum or dyspnoea. He underwent resection of a schwannoma on his left leg more
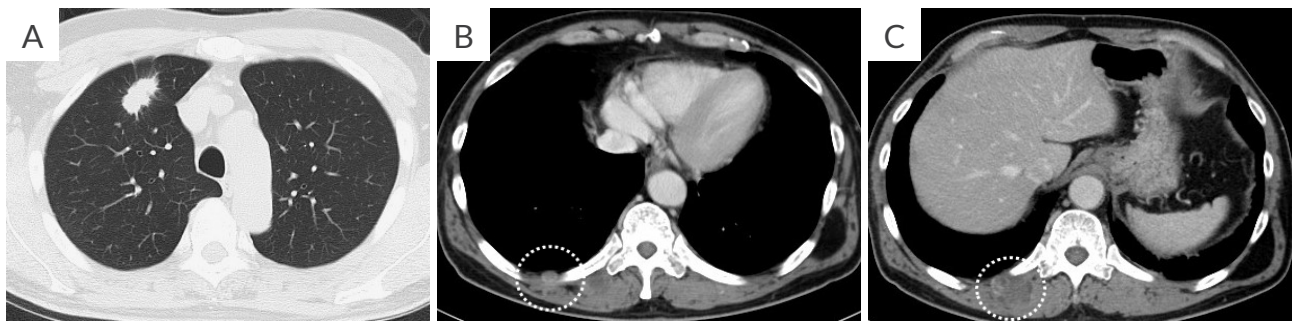
Figure 1. Contrast-enhanced chest computed tomography at the first visit showed a spiculated nodule in the right upper lung lobe (A), a peripherally enhanced nodule in the right 10th intercostal space (B), and a heterogeneously enhanced mass in the right back muscle (C)
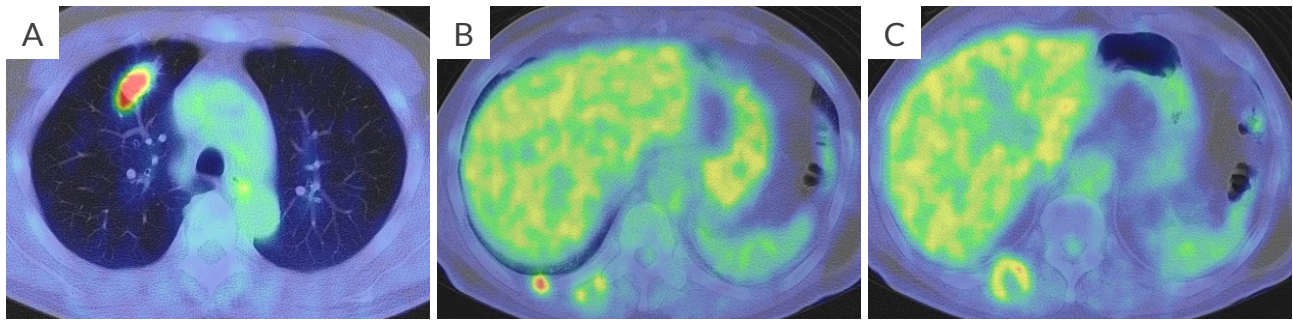

Figure 2. A positron emission tomography before the initiation of osimertinib showed high accumulations in the right upper lung lobe (A), the right 10th intercostal space (B) and the right back muscle (C)
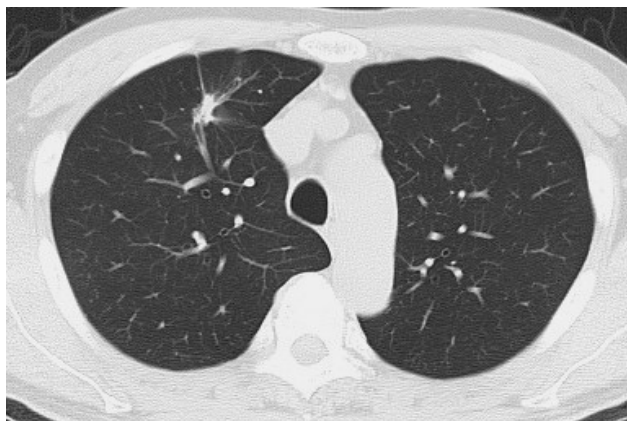

Figure 3. A chest computed tomography 6 months after the initiation of osimertinib showed a significant shrinkage of the nodule in the right upper lung lobe

than 20 years ago. Chest radiography showed a circular shadow in the right upper lung field, and chest CT on his first visit showed a nodular shadow with spiculation in the right upper lung lobe *(Fig. 1A)*. A few days later, a bronchoscopy using endobronchial ultrasonography with a guide sheath was performed, and samples from the nodule on the right upper lung lobe revealed adenocarcinoma. Contrast CT showed two heterogeneous enhancement lesions in the right intercostal space and right back muscle *(Fig. 1B and 1C)*. PET showed high accumulation in the right upper lung lobe, right intercostal space and right back muscle *(Fig. 2)*. The patient was diagnosed with lung adenocarcinoma with metastases to the right intercostal space and right back muscle (cT1N0M1c). Because his lung adenocarcinoma had an L858R mutation in the epidermal growth factor receptor, treatment with osimertinib was initiated.

A chest CT scan performed 6 months after the initiation of osimertinib showed significant shrinkage of the nodule in the right upper lung lobe *(Fig. 3)*. However, no change was observed in either the right intercostal nodule or the mass in the right back muscle. A CT-guided needle biopsy was performed on the mass in the right back muscle for histological assessment. The specimen showed proliferation of spindle-like cells without malformations, and these cells stained positive for S100 *(Fig. 4)*. The mass in the right back muscle was confirmed to be a schwannoma, not a metastasis. Surgical resection was performed for the right intercostal nodule, which was also diagnosed as a schwannoma based on intraoperative frozen section histology. Subsequently, a lobectomy with regional lymph node dissection of the right upper lobe was performed; the resected specimen did not contain any viable adenocarcinoma cells. Finally, the patient was diagnosed with non-metastatic lung adenocarcinoma (cT1cN0M0). Two years after surgical intervention, no recurrence was observed with no further treatment.

DISCUSSION

We encountered a case of lung adenocarcinoma with schwannomas in the right intercostal space and right back muscle. We initially misdiagnosed these schwannomas as metastases of adenocarcinoma because the PET scan showed a high accumulation of these benign tumours.

Schwannomas are benign peripheral nerve sheath tumours that occur as isolated sporadic lesions[3]. Dewey et al. reported that PET scans revealed a maximum standardised uptake value (SUV) greater than 3.0 in 51 lesions (68%) of 75 pathologically proven schwannomas[4]. In the present case, the PET scan showed 4.19 and 6.40 of the maximum
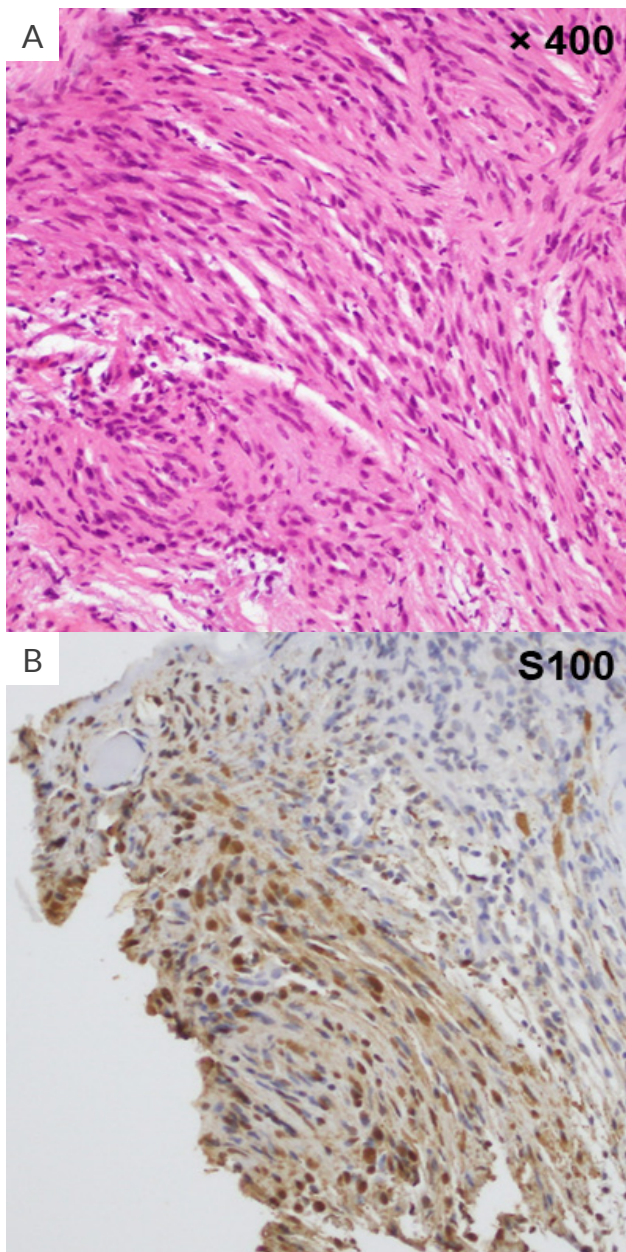
Figure 4. The biopsy obtained from the mass in the right back muscle showed proliferation of spindle-like cells without malformations using haematoxylin-eosin staining (400× magnification, A) and positive results for S100 staining (B)

SUV on the schwannoma in the right back muscle and right intercostal space, respectively.

Previous reports have indicated that schwannomas are initially diagnosed as metastases based on PET findings. Kang reported that a schwannoma on the right chest wall was initially diagnosed as a metastasis of thyroid cancer[5]. Boré et al. reported that mediastinal schwannoma was recognised as a metastasis of ovarian cancer[6]. Fujiuchi et al reported that a schwannoma in the right brachial plexus was resected as a lymph node metastasis of breast cancer[7]. Remarkably, all the above-mentioned schwannomas, including the present case, were asymptomatic. Schwannomas should be considered in cases of asymptomatic and unexpected lesions showing high accumulation on PET scans.

It is challenging to diagnose schwannomas using magnetic

resonance imaging (MRI), CT or ultrasound alone. Typical MRI findings of schwannomas include T1 iso- to hypo-intensity, T2 hyperintensity and postcontrast enhancement[8]. However, these MRI findings are not specific to schwannomas, although some lung cancers may show these MRI findings[9]. On CT findings, an iso- to hypo-attenuated, well-defined round lesion is characteristic of a schwannoma; however, Hu et al. reported that some pleural schwannomas showed rib erosion-like metastasis[10]. Moreover, while most schwannomas show homogeneous contrast enhancement, some cases show heterogeneous enhancement due to intratumoural necrosis[11]. On ultrasound, a report including 14 cases of resected gastric schwannomas revealed the difficulty in distinguishing schwannomas from gastrointestinal stromal tumours, because both tumours showed similar ultrasound findings[12]. A study that included 82 patients with retroperitoneal schwannoma showed that only 13 patients (15.9%) were correctly diagnosed with schwannoma preoperatively using imaging[13]. In summary, histological examination should be considered when schwannoma is suggested because the diagnosis is difficult using only imaging.

In conclusion, when we encounter asymptomatic and unexpected highly accumulated lesions on PET scans during the staging of neoplasms, we need to consider histological examinations of these lesions because these high accumulations might indicate benign schwannomas.

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