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18-F FDG PET/CT Diagnosed Costal Cartilage Fracture Which was Missed by Thorax CT: An Incidental Finding in a Case

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Abstract

F-18 2-fluoro-2-deoxy-D-glucose (FDG) positron emission tomography (PET) combined with computerised tomography (CT) has been widely used in the imaging of cancer. Incidental findings on FDG-PET/CT are frequently encountered during tumor evaluation in patients. In this paper, an incidentally detected costal cartilage fracture on FDG-PET/CT during suspicious pulmonary nodule evaluation in a patient was presented.

Key Words: Positron-emission tomography, Computed tomography, Costal cartilage, Fracture

Introduction

Although costal cartilage fractures are frequently seen after chest trauma, such cases are rarely diagnosed (1). Costal fractures can be identified by plain radiograph. However, costal cartilage fractures can not be seen if there is no calcification in the injury site (1). CT is an accurate imaging method in the diagnosis of costal cartilage fractures (1-3). However, in patients with no trauma history, costal cartilage fractures may be missed if there is not any significant radiological finding. MRI and chest

ultrasonographic examination can also help to diagnose costal cartilage fracture (4,5). In addition to these imaging techniques, PET/CT scanning can demonstrate variable degrees of FDG accumulation in the fracture site (6).

Although the radiologic methods such as CT and MRI demonstrate well the anatomic details, FDG-PET scanning reflects glucose metabolism in the body. FDG uptake by cells is proportionally increased with high metabolic activity. Thus, high FDG accumulation is observed in the site of tumor, infection and

inflammation in the body. In this case report, we presented an incidental costal cartilage fracture on a FDG-PET/CT scan. The highlight of this case is, costal cartilage fracture missed by a thorax CT was diagnosed by the FDG-PET/CT imaging performed for oncological purpose.

Case Report

A 56 year-old male with chest pain, cough and shortness of breath was consulted to Pulmonology Department. On the contrast-enhanced thorax CT images, a nodule 1.5 cm in diameter was seen in the superior segment of lower lobe of the left lung. Then, the patient was referred to Nuclear Medicine Department for F-18

FDG PET/CT examination for pre-diagnosis of lung cancer.

On the PET/CT images, this subpleural nodule with smooth borders showed F-18 FDG uptake (early SUVmax:2.3, late SUVmax:1.5) below the cut-off values (SUVmax<2.5) for malignancy (Figure 1). In addition, minimal increased F-18 FDG uptake and fracture line were seen in the left 7th costal cartilage (Figure 2).

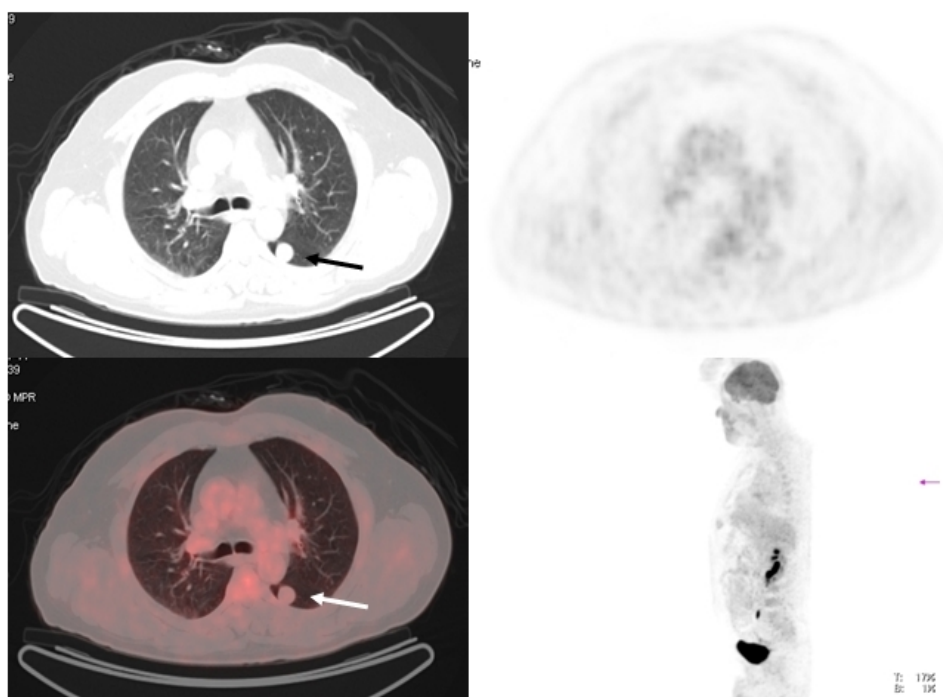


Figure 1. Subpleural solitary lung nodule showing low level FDG uptake (early SUVmax:2.3, late SUVmax:1.5) is seen on the F-18 FDG PET/CT images.

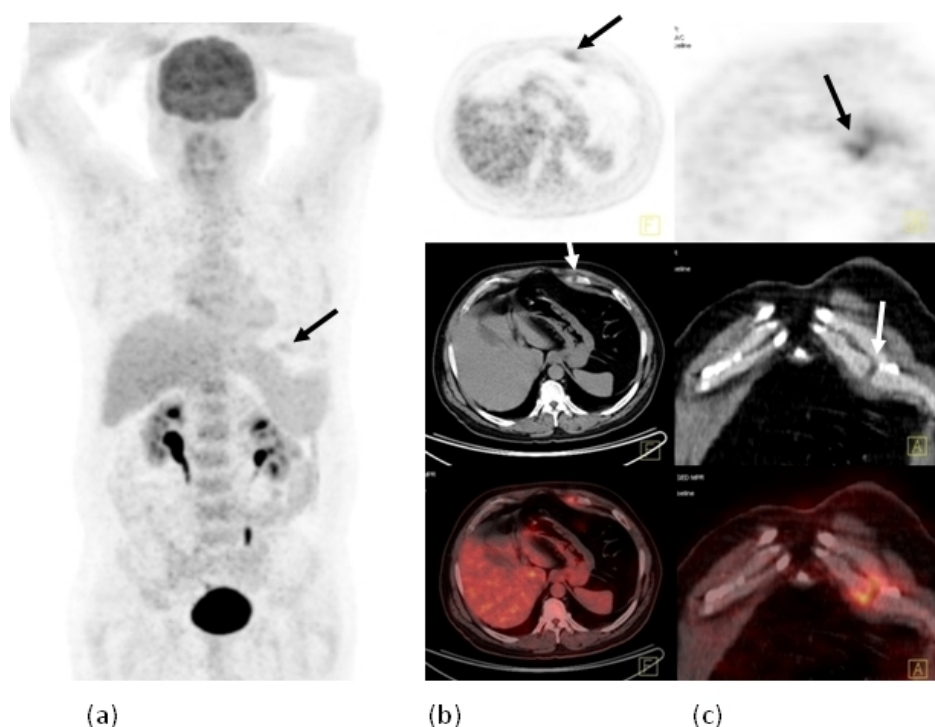


Figure 2. Slightly increased FDG uptake is observed on cartilage fracture site in the maximum intensity projection (MIP) image of the patient (a). Axial and coronal cross-sectional PET, CT and PET/CT fusion images demonstrate the cartilage fracture site (b, c). White and black arrows indicate the fracture site.

Although there was no trauma history of the patient, localized pain was found by palpation in the physical examination. Also, the patient stated that this pain was one of his complaints at the time of application to the hospital.

Discussion

Costal cartilage fracture is probably a more frequent situation than diagnosed (2). It is not radiographically recognizable unless the fracture site is calcified strongly. So, such cases have rarely reported in the literature (2). CT is also an accurate radiological examination to detect costal cartilage fracture (1-3). However, costal cartilage fracture can easily be missed in

non-traumatic patients if the radiologists do not examine these costal structures on purpose. Therefore, in patients with no trauma, PET can attract the observer's attention to costal lesion and CT images can confirm the fracture line. However, FDG PET/CT is not cost-effective in the diagnosis of costal and costal cartilage fractures and also relatively high level of radiation restricts its routine use.

In this case report, costal cartilage fracture was detected with FDG PET/CT by means of FDG accumulation on and around the fracture line which was missed by contrast-enhanced thorax CT. Thus, PET/CT has revealed the primary complaint of the patient. Cartilaginous

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tissue normally shows minimal FDG uptake due to low metabolic activity of the cells. However, in case of cartilage fracture, inflammatory cells infiltrate the area. Increased activity of macrophages and other inflammatory cells in the traumatic and inflammatory conditions is the source of the detectable FDG (7). FDG PET/CT scanning is usually performed for oncological purposes. Besides, when images are carefully assessed, many incidental findings may also be revealed (8).

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