Incidental finding of silent appendicitis on ^{18}F-FDG PET/CT in a patient with small cell lung adenocarcinoma

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Abstract
We report the incidental diagnosis of acute asymptomatic appendicitis on a fluorine-18-fluorodeoxyglucose positron emission tomography with computed tomography (^{18}F-FDG PET/CT) performed for staging of a non small cell lung carcinoma. The patient was asymptomatic and laboratory tests were normal. The case illustrates: a) the possibility to diagnose appendicitis on ^{18}F-FDG PET/CT and b) the possibility of silent acute appendicitis, although this is a rare occurrence.

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Introduction

This case report describes the incidental diagnosis of acute appendicitis on a fluorine-18-fluorodeoxyglucose positron emission tomography with computed tomography (^{18}F-FDG PET/CT) performed for staging of a non small cell lung carcinoma. The diagnosis was based on enhanced tracer accumulation in the appendix, which appeared enlarged and whose wall appeared thickened on the CT. The diagnosis was confirmed at elective surgery, but the patient was asymptomatic and no biochemical abnormalities were present, which is very rare. Before the advent of ^{18}F-FDG PET, only a few cases of asymptomatic appendicitis had been reported. This is only the fourth report of acute appendicitis without symptoms or laboratory abnormalities detected on PET. Given the many millions of PET scans that are performed yearly, this implies that silent acute appendicitis is a rare occurrence.

Case Report

A 54 years old man underwent a fluorine-18-fluorodeoxyglucose positron emission tomography with computed tomography (^{18}F-FDG PET/CT) for staging of a pulmonary nodule. He was admitted to the pneumology department because of progressive dyspnea. He had a medical history of chronic obstructive lung disease in Gold's stage IV (very severe). He was an active smoker with more than 60 pack-years. X-ray of the thorax on admission had shown a nodular opacity in the left lung, which had been confirmed on computed tomography (CT).

The PET/CT scan was obtained 92 minutes after the injection of 180.7MBq of ^{18}F-fluorodeoxyglucose. It showed increased tracer uptake in the nodule ventrolaterally in the left upper lobe (maximum standardized uptake value SUVmax 27.1) (Figure 1) and less increased uptake in a mediastinal (precarinal) lymph node. A conspicuously increased uptake was present in the appendix (SUVmax 23.4), which appeared enlarged and whose wall appeared thickened on the CT, with a diameter of 12mm (Figure 2).

The patient was asymptomatic at the time of imaging. On further interrogation, the patient described a vague discomfort in the right hemiabdomen, similar to muscular pain, a couple of weeks before, with spontaneous resolution.

Laboratory results at the time of imaging revealed no signs of infection or inflammation. Leukocytosis was 8.1x10^9/L (4.5-11x10^9/L), with a normal formula. C-reactive pro-

tein was 2.4mg/L (0-5mg/L). No other biochemical abnormalities were present. Tumor markers: carcinoembryonic antigen, prostate specific antigen and neurospecific enolase were negative.

Frozen biopsy sections of lymph nodes at mediastinoscopy were negative, so a lingulectomy through video assisted thoracic surgery was performed. Pathological examination of the resected specimen showed non small cell lung adenocarcinoma. Elective laparoscopic appendectomy was performed one month later. Histopathology (Figure 3) showed the presence of faecaloid material mixed with pus in the lumen of the appendix. Some eosinophilic granulocytes were present as well. No microorganisms were seen. No signs of dysplasia or malignancy were present. No marked signs of peri-appendicular inflammation were present.

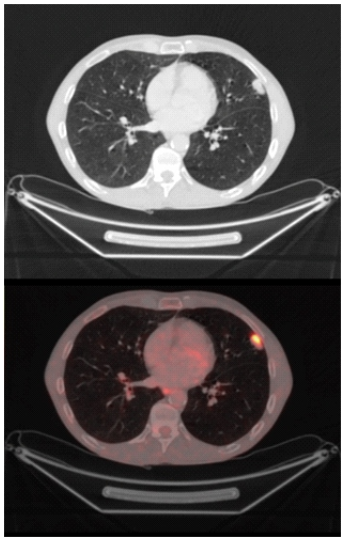

Figure 1. Axial CT (upper row) and PET/CT slices at the level of the left upper lobe pulmonary nodule, which is shown to take up tracer avidly.

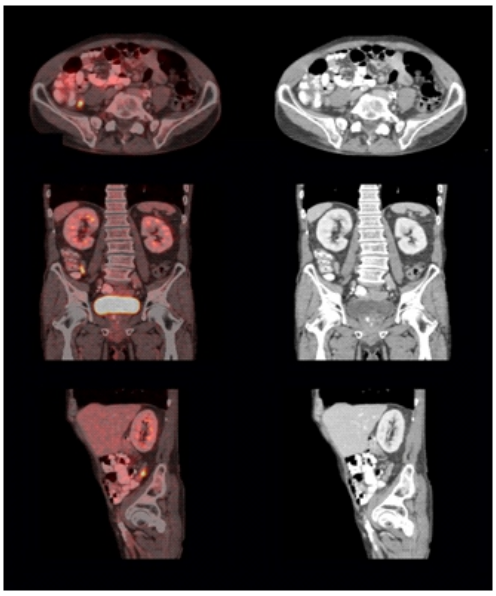

Figure 2. Axial (upper row), coronal (middle row) and sagittal slices of combined PET/CT scan (left) at the level of the appendix. The corresponding CT slices are shown at the right. Marked tracer accumulation is seen in the appendix, which on the sagittal slices is recognized as projecting upwards from the caecum.

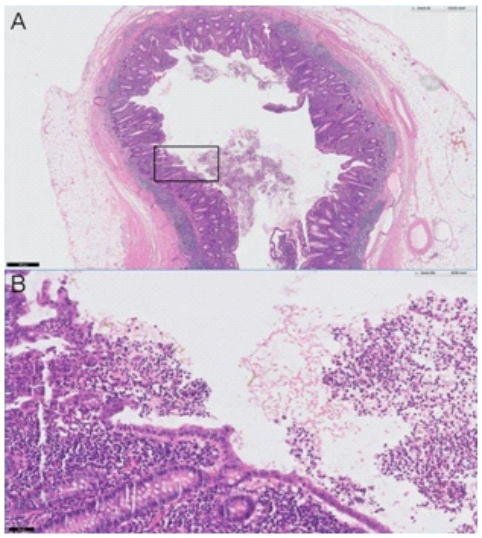

Figure 3. Hematoxylin and eosin stained tissue section at the appendix shows the presence of neutrophilic polymorphonuclear granulocytes mixed with faecaloid content in the lumen. In A (magnification 12.5X) the top of the appendix is seen. The rectangular area in A is shown at a magnification of (magnification 250X) in B.

Discussion

The lifetime risk of appendicitis is between 6% and 9% [1]. Its incidence was calculated at 86 per 100,000 per year [2]. Given these figures, it is remarkable that only few observations of appendicitis diagnosed on PET/CT have been reported [3-8].

In 4 reports, symptomatic patients underwent ^{18}F-FDG PET in the work-up of a palpable right lower quadrant abdominal mass. In each of these patients, ^{18}F-FDG uptake in the mass was seen, with SUVmax values varying from 7.27 to 22. At surgery, each of these masses was shown to be a plastron appendicitis, in which the inflammation of the appendicial wall spreads into the surrounding mesenteric fat [3-5].

In a further report [6], an ^{18}F-FDG avid appendicitis (SUV 6.9) was shown to be secondary to invasion by a small cell lung carcinoma, a rare cause of appendicitis based on obstruction of the appendicial lumen resulting in inflammation and possibly even perforation [9-12]. These patients may remain asymptomatic until the lumen of the appendix is totally occluded [6, 11, 13]. The patient described in our report was also asymptomatic, while no malignant invasion of the appendix was seen at histopathology.

Two more patients showed ^{18}F-FDG uptake in appendicitis, which was almost asymptomatic. In one, appendicitis was revealed by PET/CT during therapy assessment of a metastatic germ cell carcinoma (SUV 6.9) [7] and the other was revealed on restaging of a squamous head and neck carcinoma (SUV 4.3) [8]. In the latter patient, the pathologic findings confirmed subacute upon chronic appendicitis. Our patient thus represents only the 8th case in which appendicitis has been reported to be seen on the PET/CT scan; in

four of these patients the finding was first thought suggestive of malignancy, but the diagnosis of acute appendicitis was made after surgery [3-5].

The patient described in our report confirms the possibility of silent acute appendicitis without symptoms and without laboratory abnormalities. The nuclear physician and clinician should be aware of this possibility. The paucity of clinical and laboratory findings in our patient may relate to the absence of peri-appendicular inflammation. Before the advent of PET/CT, asymptomatic appendicitis had already been documented in a few reports [14-18]. One instance of appendicitis without abdominal pain was described in a neutropenic patient [16]. Likewise, absence of leukocytosis was absorbed in asymptomatic patients who had been given platinum-based chemotherapy for extra-intestinal neoplasia and were probably neutropenic [6, 7]. Anyhow, given the many millions of PET/CT scans that are performed yearly, and the fact that this is only the fourth report of acute appendicitis without symptoms or laboratory abnormalities detected on PET, asymptomatic acute appendicitis seems to be a rare occurrence. One can only wonder about the natural history of these cases: will the silent appendicitis at one point in time become symptomatic, will it remit spontaneously or will it become chronic [18].

Although to our knowledge no cases have been published so far in which antibiotics were the only treatment used, PET could be used as a way to monitor disease activity.

In conclusion, appendicitis, just like all inflammatory processes, may cause increased ^{18}F-FDG uptake. The clinician should be aware of the possibility of silent appendicitis. In symptomatic right lower quadrant mass lesions that take up ^{18}F-FDG, appendicitis with peri-appendicular inflammation is a differential diagnosis for malignant disease.

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