Pathol. Oncol. Res. (2011) 17:393–395
DOI 10.1007/s12253-010-9299-x

CASE REPORT

PET-CT Imaging and Reality

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Received: 4 August 2010 / Accepted: 5 August 2010 / Published online: 17 September 2010

Abstract The spectrum of human diseases caused by members of the Aspergillus genus is extensive. It ranges from allergic reactions to colonization of preexisting pulmonary cavities to invasion and destruction of lung parenchyma with pyemic spread to brain, skin, and other organs, causing rapid death. The immune status of the host is a crucial factor in determining the phenotype and severity of the disease. In this case report Chronic Necrotizing Pulmonary Aspergillosis (CNPA), a rare, locally- or semi-invasive variant of pulmonary Aspergillosis, mimicking lung metastasis is presented. The 60-year-old male patient had earlier received multiple cycles of systemic chemotherapy due to colorectal carcinoma. Our case report focuses on the benefits and the possible disadvantages of PET-CT imaging in CNPA.

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Keywords Chronic necrotizing pulmonary aspergillosis · Immunocompromised state · Metastatising colon neoplasia · PET/CT

Abbreviations

CNPA	chronic necrotizing pulmonary aspergillosis
FDG	^{18}F-fluoro-deoxyglucose
PET	positron emission tomography

Case Report

The 60-year-old male patient had a resection of the sigmoid colon due to grade II. adenocarcinoma (pT4 pN1 pMx) in August 2003 with no apparent signs of distant metastases. Between October 2003 and June 2004 twelve cycles of systemic chemotherapeutic treatment under De Gramont protocol had been completed in the Oncology Department. Interval staging examinations showed neither local recurrence nor distant metastases. In June 2005 abdominal MR imaging revealed one lesion in the eighth segment of the liver—measuring 23×25 mm in size—with high probability of intrahepatic metastasis. Cytotoxic chemotherapy under FOLFIRI protocol was started in July 2005. Surgical removal of the lesion was refused by the patient and in October 2005 the metastasis was ablated by a CT-guided radiofrequency method along with super-selective chemoembolisation. Six cycles of chemotherapy were completed under the FOLFOX protocol ending in February 2006. Two months after completion of the chemotherapy a chest x-ray revealed a small, pale, sharp contured, slightly inhomogen, round-shaped mass at the upper edge of the left hilum. Chest CT-scan was performed which showed a round-shaped lesion consistent with the x-ray finding. With the

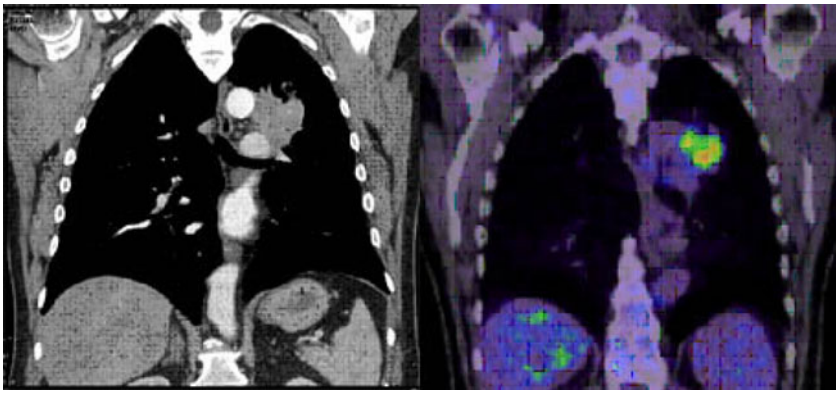

Fig. 1 CT-scan of the chest showing a left sided, centrally localised pulmonary mass. PET-CT scan showing high FDG uptake around the left pulmonary hilum

suspicion of malignancy the patient had a whole body PET-CT scan using ^{18}F-fluoro-deoxyglucose (FDG) tracer in May 2006. High FDG uptake was found in the left upper lobe consistent with the chest x-ray and CT scan findings (Fig. 1), and at the site of hepatic involvement and in the sigmoid colon.

Because of the findings the patient was referred to our bronchoscopic department for the assessment of the left pulmonary lesion. In June 2006 bronchoscopy uncovered necrotizing areas narrowing the left upper lobar bronchus expanding to and infiltrating the left main bronchus. Major endobronchial bleeding made the bronchoscopic intervention difficult and hindered sample taking. Transthoracic needle aspiration was performed but the specimen mainly consisted of blood. Sputum cytology was negative for malignancy. In September 2006 the left upper lobar pulmonary mass showed progression on the chest x-ray film. Therefore rebroncoscopy was performed and the histologic assessment surprisingly demonstrated fungal filaments in the tissue specimen without the evidence of malignant cells (Fig. 2).

The histological diagnosis of Chronic Necrotizing Pulmonary Aspergillosis was established, and the patient was referred to the oncopulmonary team. Because of an uncontrolled primary intestinal malignancy, surgery was not opted and a decision was made to perform a long term treatment with voriconazole accompanied by periodic chest CT and bronchoscopic follow-ups.

Discussion

The clinical spectrum of human diseases caused by members of the Aspergillus genus is extensive, ranging from allergic reactions *(Allergic Bronchopulmonary Aspergillosis)* to colonization of preexisting pulmonary cavities *(Aspergilloma)* to invasion and destruction of lung parenchyma *(Invasive Pulmonary Aspergillosis)* with pyemic spread to brain, skin, and other organs and rapid death [1, 2]. The immune status of the host is a crucial factor in determining the phenotype and severity of the disease after the inhalation of airborne Aspergillus spores. *Chronic Necrotizing Pulmonary Aspergillosis* presented in our report is a rare condition caused by Aspergillus species, a subacute infection most commonly seen in patients with altered local defense mechanism from preexisting pulmonary disease or in patients with risk factors that alter systemic immune status [3, 4]. Asymptomatic disease, as seen in this report, occurs in the minority of cases. The diagnosis can be confirmed by a histologic demonstration of fungal hyphae in tissue specimens and the growth of Aspergillus species on culture medium. In this case, the underlying, uncontrolled intestinal malignancy with previous multiple cycles of cytotoxic chemotherapy was the compromising factor of the immune status of the host which led to this phenotype of Aspergillosis.

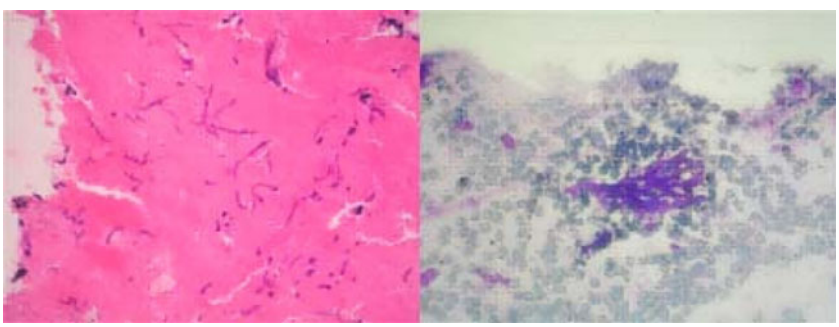

Fig. 2 Bronchial tissue specimen taken from the left upper lobar bronchus showing filamentous fungi. The appearance is highly characteristic to *Aspergillus* with hyphae 2–4 μm wide, frequently septate, and dichotomously branched

Evidence of FDG-PET imaging in oncology is based on the fact that malignant cells have higher glucose metabolism than most tissues. However, since FDG accumulation is not tumour specific while it can be present in certain inflammatory conditions such as bacterial pneumonia, pyogenic abscess, Aspergillosis, and granulomatous diseases like active sarcoidosis, clinically relevant positive findings often require confirmation [5]. Although it is a very useful and reasonably cancer-specific imaging method, other processes, such as bronchoscopic tissue sampling should follow positive results to obtain precise pathological diagnosis and establish adequate treatment strategies.

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