Pulmonary adenocarcinoma as a random finding in ^{99m}Tc-MIBI parathyroid scintigraphy

To the Editor: Technetium-99m methoxyisobutylisonitrile (^{99m}Tc-MIBI) scintigraphy is the imaging modality most often used for the identification and preoperative localization of hyperfunctioning parathyroid glands [1]. Parathyroid imaging with ^{99m}Tc-MIBI can also reveal other benign and malignant tissues in the neck and thorax as incidental findings; however, in a few cases they may have an impact on patient management [2-4].

A case of a 74 years old female with poorly differentiated adenocarcinoma of the lung, detected incidentally, by ^{99m}Tc-MIBI parathyroid scintigraphy is presented. The patient has a history of smoking 1 pack per day over 22 years and suffered from a mild chronic obstructive pulmonary disease. Beside this, the patient was asymptomatic. Laboratory tests were as follows: calcium 2.68mmol/L (reference range 2.10-2.60mmol/L); serum parathyroid hormone level 5.9pmol/L (reference range: 1.5-6.0pmol/L); serum phosphate level 1.1mmol/L (reference range 0.8-1.6mmol/L).

Scintigraphy with 422MBq ^{99m}Tc-MIBI was performed because of a mild hypercalcemia for suspected hyperparathyreoidism (Fig. 1) [5, 6]. The scan did not show pathological tracer uptake in the neck region. Thyroid uptake was absent due to ablative radioiodine (^{131}I) treatment ten years ago for Graves' disease. However, as an incidental finding ^{99m}Tc-MIBI single-photon emission computed tomography (SPET) scintigraphy showed a focal lesion in the upper lobe of the right lung. Further imaging with ^{18}F-fluorodeoxyglucose (^{18}F-FDG) positron emission tomography/computed tomography (PET/CT) 65min after intravenous injection of 289MBq ^{18}F-FDG revealed intense hypermetabolism in the right upper posterior lung lobe corresponding to the region of ^{99m}Tc-MIBI SPET uptake, to a satellite lesion of the same lobe and to a lymph node of the right hilum (Fig. 2). The findings were suspicious for a malignant tumor and metastases. Patient underwent CT-guided percutaneous lung biopsy and histopathological analysis showed a poorly differentiated adenocarcinoma of the lung. Lung cancer was resected by lobectomy of the right upper lobe including extensive lymph node dissection. Final histopathological analysis confirmed the primary tumor and the hilar lymph node metastasis.

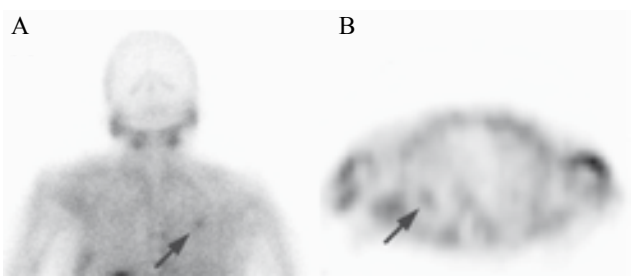

Figure 1. ^{99m}Tc-MIBI scintigraphy (A) Planar posterior image of the thorax (422MBq, 15min post-injection) and (B) a transversal SPET image (130min post-injection). Images show a focal tracer uptake (arrow) in the upper lobe of the right lung.

In general, up to 92% of the patients with lung cancer are asymptomatic and their cancers are diagnosed incidentally for example within the scope of screening programs [11]. Malignancy-associated hypercalcemia is a common paraneoplastic syndrome and a frequent complication of advanced lung cancer, especially squamous cell carcinoma, breast cancer and multiple myeloma. The mechanism responsible for 80% of malignancy-associated hypercalcemia are humoral factors produced by the primary tumor, collectively known as humoral hypercalcemia of malignancy. The vast majority of humoral hypercalcemia of malignancy is caused by tumor-produced parathyroid hormone-related protein [12]. The development of hypercalcemia often purports a poor prognosis and is a major life-threatening metabolic disorder [12, 13].

The radiotracer ^{99m}Tc-MIBI is a non-specific imaging agent and is taken up by both benign and malignant tumors, including lung cancer [4, 7, 14]. This case demonstrates that abnormal, unexpected focal lesions on a ^{99m}Tc-MIBI scintigraphy should be further evaluated, with ^{18}F-FDG-PET/CT which belongs to the standard of care in lung cancer [8-10, 15]. *In conclusion*, this case showed that malignant lung lesions may cause focal ^{99m}Tc-MIBI uptake in a parathyroid SPET scan and that such abnormalities outside of the thyroid bed should be reported and treated accordingly.

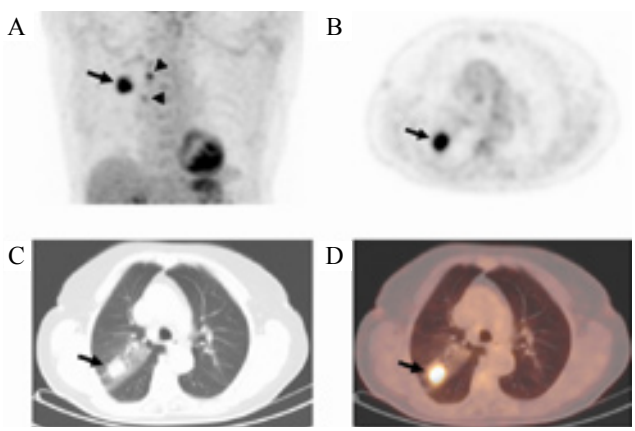

Figure 2. PET/CT imaging demonstrate the intensive increased ^{18}F-FDG-avidity of the bronchial cancer and its metastases (A: Maximum intensity projection (MIP); B: axial PET image; C: axial CT image in lung window); D: axial fusion PET-CT image. Images show the primary lesion (arrow) and a satellite metastasis of the same lobe and a hilar lymph node metastasis (arrowheads).

The authors declare that they have no conflicts of interest.

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