Differentiated thyroid cancer with osteo-granulomatous inflammation: A case report

Yan Zhihua MD,
Guo Mingzhen MD,
Cheng Bing MD,
Wu Tong MD,
Li Xiangzhou MD

Nuclear Medicine Department, The First Affiliated Hospital of Zhengzhou University, Zhengzhou 450000, China

Keywords: Differentiated thyroid carcinoma - Cryptococcal infection - PET/CT - Pulmonary nodules

Corresponding author:
Guo Mingzhen,
Department of Nuclear Medicine,
The First Affiliated Hospital of Zhengzhou University,
Zhengzhou 450000, China
guomingzhen0066@163.com

Received:
5 Jan 2024
Accepted revised:
15 May 2024

Abstract

Objective: Cryptococcus, a genus of fungi, primarily includes Cryptococcus neoformans and Cryptococcus gattii, both known to cause human infections. Skeletal infections are rare, and there have been no reported cases of bone cryptococcal infection in conjunction with differentiated thyroid carcinoma. **Subject and Methods:** A 56-year-old female presented with a one-month history of "cough and throat irritation."Chest CT revealed scattered small nodules in both lungs, suggestive of metastasis. There was minimal inflammation in both lungs, and scattered lymph nodes were observed in the mediastinum and upper pulmonary hilum. **Results:** The patient was diagnosed with differentiated thyroid carcinoma complicated by cryptococcal infection. Antifungal treatment with itraconazole 200mg/day was initiated, and after 3 months, clinical symptoms disappeared, with a reduction in lung nodules observed in follow-up chest CT. **Conclusion:** When diagnosing distant metastasis in differentiated thyroid carcinoma, a comprehensive analysis combining imaging studies and serum thyroid globulin plays a complementary role, as illustrated in this case of differentiated thyroid carcinoma concurrent with cryptococcal infection.

Hell J Nucl Med 2024; 27(2): 149-153 *Epub ahead of print: 6 August 2024* *Published online: 28 August 2024*

Introduction

Cryptococcus belongs to a group of fungi, and which mainly cause human infection by cryptococcus neoformans and Cryptococcus Gattii. Cryptococcus is the most commonly founded in patients with immune deficiency. About 30% of AIDS patients may be infected with cryptococcus, nevertheless, the infection rate is 1/100, 000 in patients with normal immunity. Cryptococcus can infect any human organ or tissue, the most commonly is the central nervous system, followed by the lungs and skin, skeletal infections are rare founded. The differentiated thyroid carcinoma (DTC) combined with bone granulomatous inflammation has not been reported.

Case Report

A 56-year-old female patient was admitted to the hospital due to cough and pharyngeal itching for 1 month. Chest computed tomography (CT) showed scattered small nodules in both lungs with metastasis. One year ago, thyroidectomy was performed due to thyroid space occupying lesion. The post operative pathology showed: minimal papillary carcinoma in left lobe, which belongs to the classic type and the fibrous capsule was invaded; Two out of ten lymph nodes in the neck central region were metastasized, and some lymph nodes presented granulomatous inflammation. Levothyroxines odium tablets was taken orally regularly after surgery. Before iodine-131 (^{131}I) ablation, fluorine-18-fluorodeoxyglucose (^{18}F-FDG) positron emission tomography (PET)/CT was performed and multiple high-density nodules in both lungs showed widespread ^{18}F-FDG uptake and considered as metastatic focuses. Intense ^{18}F-FDG uptake in sternum, right scapula, right acetabulum and bilateral pubic bone, considered as metastases (Figures1&2).

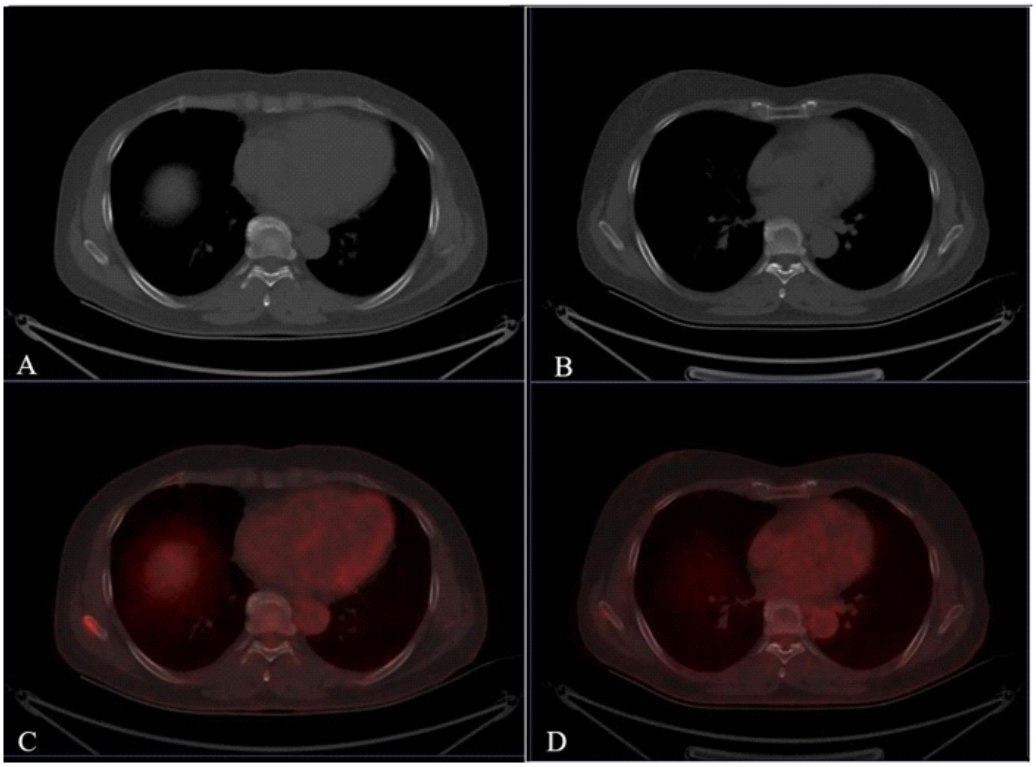

Figure 1. Figures A and C showed intense ^{18}F-FDG uptake in right scapula before anti-cryptococcal therapy. Figures B and D show that significantly lower ^{18}F-FDG uptake in the right scapular compared with previously.

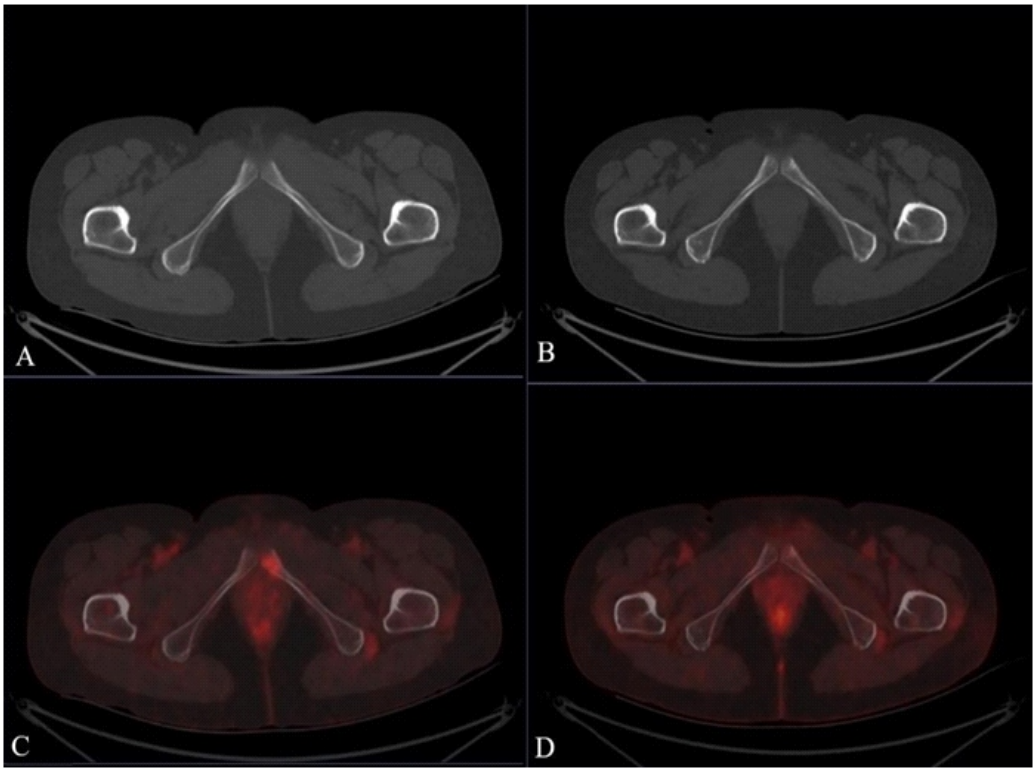

Figure 2. Figures A and C showed intense ^{18}F-FDG uptake before anti-cryptococcal therapy. Figures B and D showed no up-taken in the left pubis.

Due to the small sizes of bilateral pulmonary nodules, the difficulty and risk of the puncture biopsy were high, pelvic bone biopsy was performed after fully communication with the family members, and the pathological report showed granulomatous inflammation of the humiliation bone. Serum thyroglobulin (Tg) of the patient before radioiodine therapy (RAI) was 0.04ug/L (3.5-77ug/L), anti-thyroglobulin autoantibodies (TgAb) was 24.39IU/mL (0-115IU/mL), serum free triiodothyronine (Ft3) was 3.23pmol/L (3.28-6.47pmol/L), free thyroxine (Ft4) was 1.89pmol/L (7.9-18.4), thyroid-stimulating hormone (TSH) was greater than 50IU/mL (0.56-5.91IU/mL). Iodine-131-whole-body scans (^{131}I-WBS) showed no abnormal iodine uptake in bilateral pulmonary nodules and all bones.

Discussion

Thyroid cancer is one of the most common malignant tumors of head and neck, DTC accounts for the vast majority of thyroid cancer, includes papillary thyroid cancer (PTC) and follicular thyroid cancer (FTC) [3]. The common distant metastasis sites are lung, bone and brain [4]. In this case, the patient occurred cough and pharyngeal itching early 1 year after thyroidectomy. Multiple nodules in both lungs and abnormal bone focus were found in the chest CT and PET/CT. Combine the patient's treatment history and the regularity of thyroid cancer metastasis, the lesions above were considered as metastases of thyroid cancer. Study has reported that serum thyroglobulin in the stimulated state (S-TG)≥47.1ug/L predict distant metastasis [5], but the patient's S-TG was 0.04 ug/L. Obviously, serum thyroglobulin of the patient did not support the diagnosis of distant metastasis from thyroid cancer. Furthermore, ^{131}I Rx-WBS (Post-therapy WBS, Rx-WBS) (Figure 4) showed no ^{131}I uptake in both bilateral lung nodules and bone, therefore it did not also support lung metastasis and bone metastasis of DTC. After consultation with respiratory experts, anti-cryptococcus treatment was suggested. Three months after treatment with itraconazoleat 200mg/d, clinical symptoms of the patient disappeared, and pulmonary nodules were smaller than before in chest CT re-examination.

Although the patient did not have a biopsy of the pulmonary nodules, the pulmonary nodules partially disappeared and partially decreased after anti-cryptococcal treatment, so it was considered that the pulmonary nodules were not related to thyroid cancer metastasis. In the same way, although the bone biopsy did not find clear cryptococcal infection, the anti-cryptococcal treatment in the patient was effective, thus considering that the bone lesions were caused by the cryptococcal infection and were not metastatic lesions (Figure 5). Tips in this case: first, thyroglobulin as tumor marker of differentiated thyroid cancer, the sensitivity and specificity is-beyond doubt; second, In addition to the positive findings of ^{18}F-FDG PET/CT, we should also refer to tumor markers and other examinations, if necessary puncture biopsy is considered; third, cryptococcal infection is rare in the patients with normal immune, especially bone infections were more rare, but in clinical, when meeting similar cases, we should not exclude the possibility of cryptococcal infections.

The authors declare that they have no conflicts of interest.

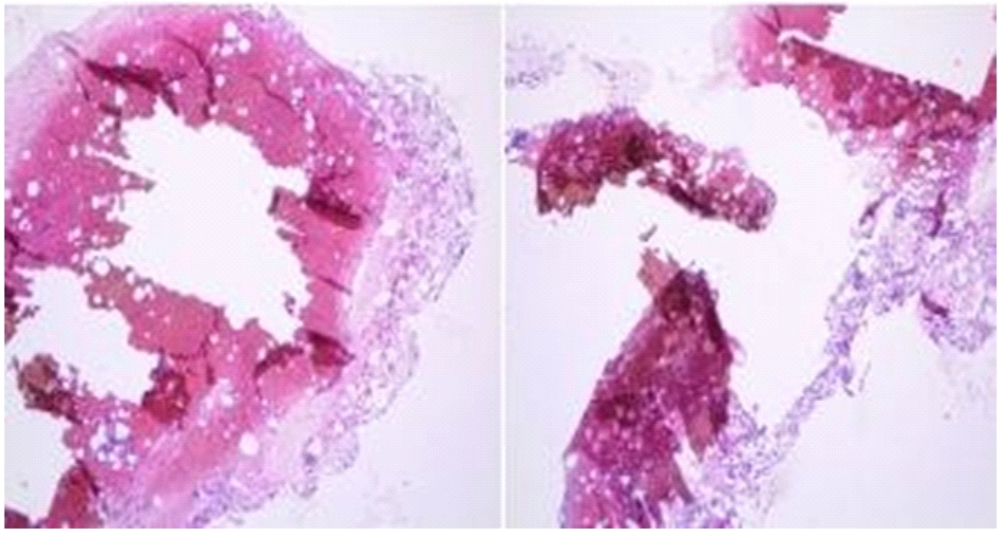

Figure 3. Biopsy of the pubis result: Granulomatous inflammation of the pubis. Immunohistochemical results: AE1/AE3(CK)(-). Special staining results: acid-fast (-), PAS (-) and luansilver (-).

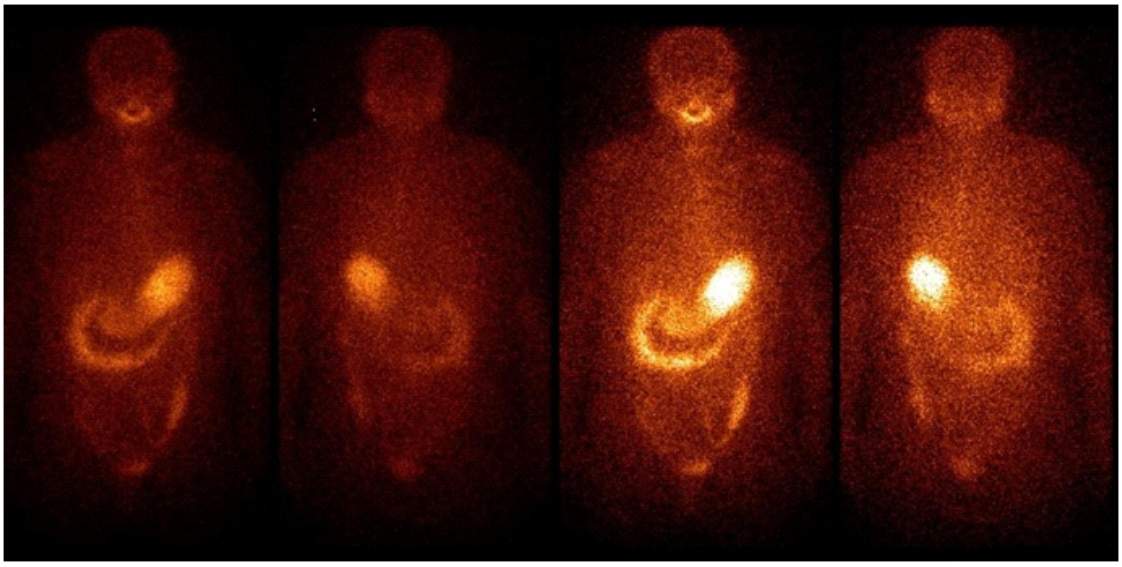

Figure 4. The figure shows the imaging after ^{131}I treatment, with minimal residual thyroid imaging in the thyroid area, and no abnormal iodiological uptake foci in other parts of the body.

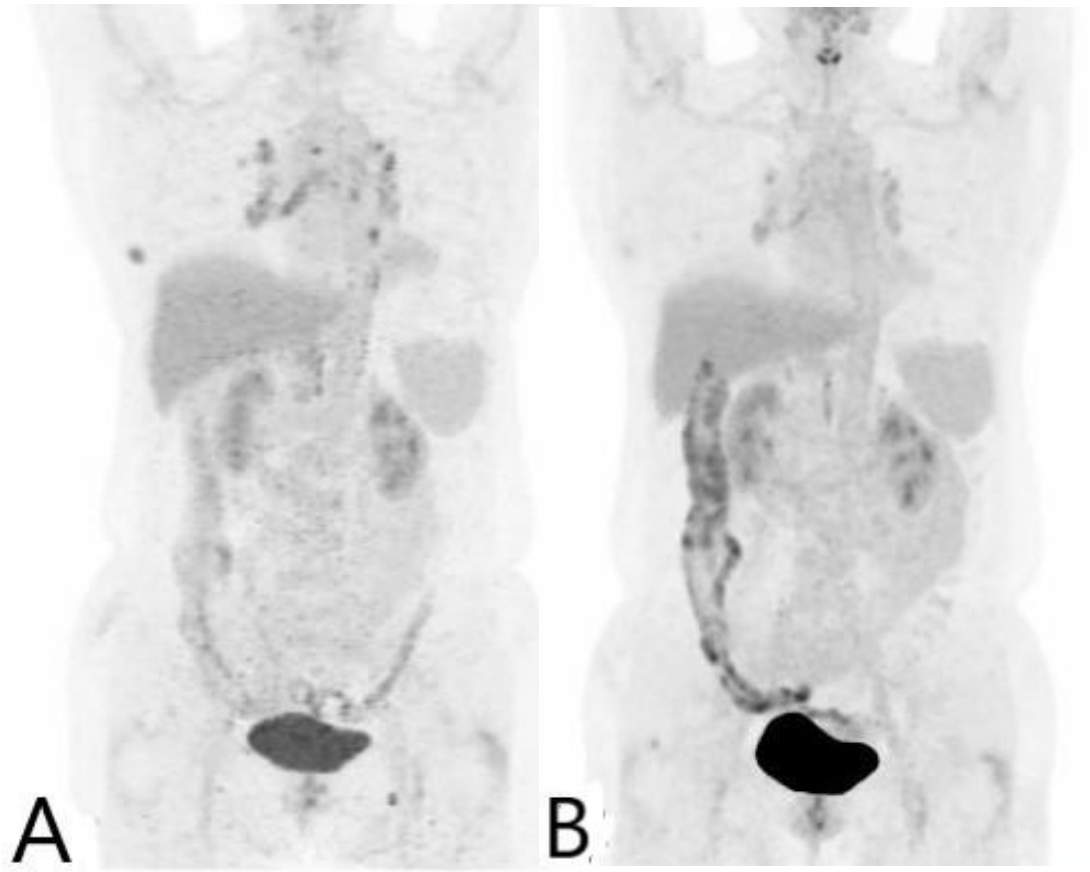

Figure 5. Figure A showed abnormal ^{18}F-FDG uptake of the right scapula before anti-cryptococcal therapy; Figure B showed significantly lower ^{18}F-FDG uptake in the right scapular compared with previously.

Bibliography

1. Mitchell TG. Cryptococcosis in the era of AIDS-100 years after the discovery of Cryptococcus neoformans. *Clin Microbiol Rev* 1995; 8: 515-48.
2. Wen Hai. Expert consensus on the diagnosis and treatment of cryptococcal infections. *Chinese Journal of Mycology* 2010; 5 (02): 65-68+86.(in Chinese).
3. Zhang X, Liu DS, Luan ZS et al. Efficacy of radioiodine therapy for treating 20 patients with pulmonary metastases from differentiated thyroid cancer and a meta-analysis of the current literature. *Clin Transl Oncol* 2018; 20: 928-35.
4. Yoon HJ, Jeon MJ, Kim M et al. Unusual metastases from differentiated thyroid cancers: A multicenter study in Korea. *PLoS One* 2020; 15(8): e0238207.
5. Yang X, Liang J, Li TJ et al. Postoperative stimulated thyroglobulin level and recurrence risk stratification in differentiated thyroid cancer. *Chin Med J* 2015; 128(8): 1058-64.