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Hepatopulmonary metastases from papillary thyroid microcarcinoma: A case report

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Abstract

BACKGROUND

Papillary thyroid carcinoma (PTC) is the most common endocrine malignancy. Papillary thyroid microcarcinoma (PTMC) accounts for the majority of PTC cases. However, concurrent pulmonary and hepatic metastases of PTMC are rarely seen. Here, we present a patient with coexisting liver and lung metastases from PTMC.

CASE SUMMARY

We describe a 26-year-old woman with PTMC with multiple concurrent metastases. After 3 d of unexplained fever, she was admitted to our hospital. Her thyroid functional tests were abnormal. Her positron emission tomography (PET)/magnetic resonance imaging (MRI) examination showed increased fluorodeoxyglucose (FDG) metabolism and space-occupying lesions in the left lobe of the thyroid. Additionally, PET/MRI images revealed multiple nodules in the lung and liver with increased FDG metabolism. Chest computer tomography (CT) showed multiple pulmonary metastases. Abdominal ultrasound and liver MRI showed multiple space-occupying lesions in the liver. The patient underwent total thyroidectomy and central lymph node dissection.

Postoperative pathological analysis showed a papillary microcarcinoma multiplex in the left lobe of the thyroid. A diagnosis of hepatopulmonary metastases from papillary thyroid microcarcinoma was made. The patient was given iodine-131 treatment one year after the surgery. She recovered well after the operation, and the incision healed well. After discharge, she was treated with oral levothyroxine sodium tablets, and symptomatic and supportive treatments were also given to promote radioactive excretion and prevent bone marrow suppression by iodine-131 treatment.

CONCLUSION

Since patients with thyroid cancer concurrent with hepatopulmonary metastases have rarely been reported, our case will highlight the clinical and pathological profiles of these patients.

Key Words: Papillary thyroid microcarcinoma; Distant metastasis; Liver; Lung; Case report

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Core Tip: Concurrent pulmonary and hepatic metastases of papillary thyroid microcarcinoma are not often seen due to their rarity and nonspecific presentations. Herein, we provided a successful example of the diagnosis and treatment of pulmonary and hepatic metastases of papillary thyroid microcarcinoma in a young female patient. Our case emphasizes that distant metastases of papillary thyroid carcinoma can occur in young patients.

INTRODUCTION

Thyroid cancer is the most common endocrine tumor with a strong female preponderance (3:1)[1]. Papillary thyroid carcinoma (PTC) is a well-differentiated endocrine malignancy. Papillary thyroid microcarcinoma (PTMC) is defined by the World Health Organization as PTC with a maximum diameter ≤ 10 mm. Papillary thyroid microcarcinoma increases the incidence of thyroid cancer by 50%[2]. The main manifestations of PTCs are neck masses and thyroid nodules. However, distant metastasis of PTMC is rare, affecting bone, lung and chest lymph nodes, although local regional metastases in neck lymph nodes are commonly seen[3-5]. PTMC simultaneously metastasized to the liver and lung is very rare. Here, we report a case of PTMC concurrent with liver and pulmonary metastases.

CASE PRESENTATION

Chief complaints

A 26-year-old woman who presented with unexplained fever was admitted to our hospital for further examination.

History of present illness

The patient showed a clear mind and no significant weight loss in the past three months.

History of past illness

She had no smoking or drinking history and no family history of tumors. She had no cough or expectoration. Ethical approval for publishing this case was obtained from the First Medical College of Zhejiang Chinese Medical University Research Ethics Committee.

Personal and family history

She denied a family history of hereditary disease.

Physical examination

Her physical examination showed nothing abnormal

Laboratory examinations

Her thyroid function tests showed elevated levels of thyroid-stimulating hormone and antithyroglobulin antibody, with a decreased level of thyroglobulin. Her biochemical tests showed elevated levels of triglycerides and cholesterol. Routine blood tests showed neutrophilia and lymphocytosis. Humoral tumor screening presented an elevated level of CA50. Her blood coagulation function was normal.

Imaging examinations

She underwent a positron emission tomography/magnetic resonance imaging (PET/MRI) examination in our hospital. The PET/MRI images showed a space-occupying lesion in the left thyroid with increased fluorodeoxyglucose (FDG) metabolism (Figure 1A), and a Computer tomography (CT) scan revealed that the lesions in the left lobe of the thyroid showed low-density nodular changes involving the thyroid capsule (Figure 1B). The PET/MRI images also showed multiple diffuse nodules (maximum 0.8 cm) in the lung with increased FDG metabolism and multiple nodules (maximum 2.0 cm) in the liver with increased FDG metabolism (Figure 1). Chest CT showed multiple metastases in both lungs, multiple low-density shadows in the liver, and small calcifications in the left breast (Figure 2). Abdominal ultrasound showed a fatty liver and multiple liver nodules (Figure 3A). MRI showed multiple space-occupying lesions in the liver (Figure 3B-D). Whole-body bone imaging and organ tomography showed a metabolically active left tibia and unevenly increased local bone density (Figure 4).

FINAL DIAGNOSIS

Collectively, based on the medical imaging results and pathological features, a diagnosis of hepatopulmonary metastasis from papillary thyroid microcarcinoma was made.

TREATMENT

The patient underwent thyroidectomy and central node dissection. Postoperative pathology revealed multiple papillary microcarcinomas in the left thyroid and one foci with the follicular subtype (Figure 5). The carcinomas had invaded the capsule and presented no lymph node metastasis. The immunohistochemical results showed positive signals for CK-19, Gal-3, TTF, and Ki-67 (3%) (Figure 6).

OUTCOME AND FOLLOW-UP

One year after thyroid cancer surgery, the patient was given iodine-131 treatment in our hospital. As shown in Figure 7, iodine imaging in the thyroid area was considered to be residual thyroid tissue. Multiple small nodules were found in both lungs, with no significant iodine uptake. A small amount of pleural effusion was observed on both sides of the lung. Multiple lymph nodes were present in the bilateral neck and supraclavicular areas without iodine intake. Physiological iodine intake was observed in the nasopharynx, oral cavity, salivary glands, gastrointestinal tract, and bladder (Figure 7). The patient had recovered well after the operation, and the incision had healed well. The patient was treated after the iodine therapy with daily oral levothyroxine sodium administration.

DISCUSSION

PTC accounts for approximately 85% of all follicular-derived well-differentiated thyroid cancers[6]. The 10-year survival rate is more than 80%, and these tumors are considered to be indolent[7,8]. PTMC is a subtype of PTC with a foci diameter ≤ 10 mm. PTMC accounts for the majority of PTC cases. Distant metastasis of PTMC is rare. The most common metastatic sites include the bone and lung, while brain, eye, breast, liver,

kidney, muscle, and skin metastases are not commonly seen and only appear in patients with advanced tumor diseases. Here, we present a patient with PTMC who had simultaneous metastases to the lung and liver. Coexisting lung and liver metastases in PTC patients are not commonly seen.

Predictive factors for PTC metastasis included age, sex, thyroid function, Hashimoto's thyroiditis, multifocal tumor, tumor size, capsular invasion, and extrathyroidal extensions. The histopathological characteristics of tumors, such as their bilaterality, multifocality, extrathyroidal extension, capsular invasion, and lymph node metastasis, are important indicators of their invasiveness and they affect the prognosis[9,10].

Liver metastasis from PTMC is a rare event with a reported frequency of only 0.5%[11]. Liver masses can be detected by various imaging modalities, such as ultrasonography, computed tomography, and magnetic resonance imaging. Liver masses are usually ^{131}I-negative in PTMC patients with liver metastasis[12], which is consistent with the observations in our patient. PTC liver metastasis has a poor prognosis. Surgical resection of liver lesions has been reported to offer the best chance for prolonged survival[13]. An increased age in cases of thyroid cancer with lung metastasis increases the mortality risk. In a study performed by Huang, the mortality rates of thyroid cancer with lung metastasis were 32.78% (118/360), 46.71% (156/334), 53.93% (199/369), 58.96% (158/268) and 82.76% (72/87) in patients aged ≤ 55 years, > 55 ≤ 65 years, > 65 ≤ 75 years, > 75 ≤ 85 years and > 85 years[14]. Since our patient was a young mother of a young child, we suggested routine follow-up liver function tests to monitor the pathophysiology of the liver.

PTMC has no early typical symptoms due to its anatomic location. Therefore, a delay in clinical diagnosis is inevitable, which leads to its diagnosis in the advanced stage. Thus, a primary tumor in the thyroid is usually not diagnosed until the symptoms of a secondary metastatic tumor appear[15]. In this case, the patient did not exhibit clinical manifestations of the disease at the initial stage, and no corresponding clinical symptoms were found even after metastasis occurred. Multiple metastases of

thyroid cancer were incidentally found during the patient's examination for unexplained fever, indicating that the disease is easily missed. Therefore, a better clinical index or screening method is needed.

Male patients with distant metastases from PTMC have a high risk of death[8,15]. However, PTC patients with distant metastases have lower levels of dedifferentiation than differentiated thyroid carcinoma patients with distant metastases. Therefore, PTC exhibits more indolent behaviors than differentiated thyroid carcinoma, even with distant metastases. PTC nevertheless has a generally favorable prognosis for long-term survival, even with distant metastases. The clinical manifestations vary from the early to late stages of the disease[6]. The maximal PTMC foci is 1 cm or less[16]. In our patient, postoperative pathology revealed one PCT foci with a diameter of 0.8 cm. Total thyroidectomy with central node dissection is an effective treatment for PTC patients[17]. Long-term follow-up of PTMC patients is needed after surgical treatment[18,19]. Periodic thyroglobulin and thyroglobulin autoantibody measurements are recommended for PTMC patients[20]. An active surveillance approach is recommended by the American Thyroid Association guidelines as an alternative option for patients with low-risk PTMC[18]. Our patient was a 26-year-old woman with PTMC with multiple metastases. She was recommended to take levothyroxine sodium tablets and consume a low iodine diet after her surgery. We also suggested routine thyroid function test and liver imaging during follow-up. She is still alive and actively engaging in daily life.

Our patient's diagnosis of hepatopulmonary metastasis from papillary thyroid carcinoma was based on imaging findings and pathological results. PET/MRI, ultrasonography, CT, and MRI revealed multiple nodules in the liver and lung. Our case will provide a valuable reference for the diagnosis and treatment of papillary thyroid microcarcinoma patients in the future.

CONCLUSION

In conclusion, we present the case of a young woman with PTMC metastasis to her liver and lung. Since patients with thyroid cancer concurrent with hepatopulmonary

metastases have rarely been reported, our case highlights the clinical and pathological profiles of these patients.

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