Thyroid Metastasis from Breast Carcinoma Accompanied by Papillary Thyroid Carcinoma

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Key Words

Metastatic thyroid carcinoma · Breast carcinoma · Papillary thyroid carcinoma

Abstract

Metastasis to the thyroid gland is very rare. Recently, we experienced a case of thyroid metastasis from breast cancer accompanying a papillary thyroid. A 51-year-old female patient presented with a palpated lymph node on her left lateral neck. The patient had undergone a left modified radical mastectomy followed by chemotherapy and hormonal therapy 12 years prior. Ultrasonography of the neck revealed a malignant looking nodule at the left thyroid lobe, measuring 0.9 × 0.9 cm, and several cystic nodules at the right thyroid lobe. Ultrasonography of the neck additionally revealed a malignant looking lymph node at the right level VI. Fine-needle aspiration of the left thyroid lobe resulted in a diagnosis of papillary thyroid carcinoma and that of the right level VI in Hurthle cell lesion. The patient had a total thyroidectomy with selective dissection of the left neck node. Pathologic assessment of the specimen revealed metastatic carcinoma from the breast carcinoma and papillary thyroid carcinoma. Although the thyroid gland is highly vascularized, metastasis of malignant tumors to the thyroid is relatively rare and detection of metastasis shows a low frequency. So a careful evaluation of thyroid tumor should be considered in a patient with a history of other malignancy.

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Introduction

Breast cancer is the common cancer in women and the leading cause of death due to tumors [1]. Breast cancer is detected relatively early due to the development of screening; however, distant metastases or local recurrences are noted in many patients even after

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radical treatment. The common lesions of breast cancer metastasis include the liver, lungs, brain, and bone, while metastasis to the thyroid gland is quite rare [2]. Indeed, despite the fact that the thyroid is highly vascularized, metastasis of malignant tumors to the thyroid in general is rare [3]. Recently, diagnoses of metastatic thyroid glands have increased due to the development of diagnostic techniques such as thyroid ultrasound and fine-needle aspiration. Common primary sites of metastatic thyroid tumors are breast and lung cancer in autopsy series, while renal cell carcinoma is the most common site identified clinically [4]. Here, we report a case of thyroid metastasis from breast cancer accompanying primary thyroid cancer.

Presentation of Case

A 51-year-old female patient presented with a palpable lymph node on her left lateral neck in December 2012. The patient had undergone a left modified radical mastectomy for T1N1 invasive ductal carcinoma in April 2002 and received adjuvant chemotherapy (cyclophosphamide, methotrexate, 5-fluorouracil chemotherapy, 10 cycles) and hormonal therapy (tamoxifen).

Ultrasonography of the neck identified a 0.9-cm nodule of the left thyroid (fig. 1) and 1-cm lymphadenopathy at the right level VI, both of which appeared to be malignant. Using fine-needle aspiration, a diagnosis of left thyroid nodule with papillary thyroid carcinoma was made, and the right level VI lymph node was diagnosed as Hurthle cell lesion. Complete blood count, serum chemistry tests, and thyroid function tests revealed no abnormal findings. The level of tumor marker Ca 15-3 (19.52 U/ml) and thyroglobulin measurements in fine-needle aspiration (5.07 ng/ml) were in the normal range.

The patient underwent a total thyroidectomy with a selective dissection of the left neck node. In the surgical field, solid masses on both thyroid lobe and isthmus were evaluated (fig. 2). The frozen section was performed on both thyroid lobes. The mass of the right thyroid lobe was characterized histologically as metastatic carcinoma, most likely originating from the breast carcinoma, and was confined within the thyroid capsule and abutted on by the carcinoma itself on both the right and left lobes of the thyroid gland (fig. 3). Lymphovascular invasion was noted. In addition, the patient had a 6.0 × 4.0 mm sized primary papillary carcinoma just beyond the thyroid capsule in the left lobe. All 7 of the cervical lymph nodes around the thyroid exhibited metastatic carcinoma. Following surgery, treatment of the patient with docetaxel and doxorubicin chemotherapy is ongoing.

Discussion

A number of studies have evaluated breast cancer accompanying thyroid disease. Breast cancer accompanies autoimmune thyroid diseases as well as non-autoimmune thyroid diseases such as thyroid nodules with a high frequency, and the incidence of thyroid cancer is a known risk factor for breast cancer [5]. The association of thyroid cancer and breast cancer was first reported by Chalmers and Benjamin in 1996 [6] after observing that 8 of 92 thyroid cancer patients were subsequently diagnosed with breast cancer. Several studies have shown that the incidence of thyroid cancer in breast cancer patients is increased compared to the general population by approximately 20–30%. Similarly, the incidence of breast cancer is increased during median follow-up of patients with thyroid cancer [7, 8]. The link between breast cancer and thyroid cancer is supposedly associated with genetic

and environmental factors. However, unlike cases where breast cancer is diagnosed following thyroid cancer, reports of breast cancer metastasizing to a thyroid gland with primary papillary cancer are very rare.

A total of 33% of patients with breast cancer experience hematogenous metastasis of the lungs, liver, bone, and gastrointestinal tract. Liver and lung metastases are common in invasive ductal carcinoma, whereas gastrointestinal tract, peritoneum, and retroperitoneum metastases are common in invasive lobular carcinoma [9]. Estrogen and progesterone receptor status is well correlated between metastasized organs and primary cancerous tissue. Further, expression of hormone receptors in breast cancer is associated with disease prognosis. Positive immunohistochemical staining of the estrogen receptor is observed in approximately 50–80% of cases, whereas positive progesterone receptor expression is observed in 38–59% of cases; estrogen receptor-negative cases are rare [10, 11]. Estrogen receptor-positive cases tend to metastasize primarily to the thyroid and parathyroid glands, while progesterone receptor-positive cases tend to metastasize to the myocardium or the epithelium of the gastrointestinal and urinary tracts [12]. In the present study, expression of estrogen receptor was positive and that of progesterone receptor was negative.

The thyroid gland is highly vascularized; however, metastasis of malignant tumors to the thyroid is relatively rare. The exact mechanism for the lack of metastasis to the thyroid is unknown, but it is thought to be associated with immunological mechanisms [3]. The incidence of metastasis to the thyroid gland in autopsy series varies from 0.5 to 24.2% [13, 14], the variation of which is likely due to the precision of investigation during the autopsy. In autopsy series, the common primary sites of metastatic thyroid tumors are breast and lung cancer, while renal cell carcinoma is the most common site clinically [4]. In a clinical setting, metastasis of the thyroid gland is detected at a low frequency, and metastasis of the thyroid gland is most commonly detected at the same time as the diagnosis of the primary site or shortly thereafter. In some cases, however, diagnosis of thyroid gland metastasis takes significantly longer. These differences are thought to be related to the characteristics of the primary cancer [13], and it is well known that primary cancers such as renal cell carcinoma, breast cancer, cervical cancer, and melanoma take a long time to metastasize to the thyroid [3].

Diagnosis of thyroid metastasis is difficult, and in general, most cases are asymptomatic and identified due to the appearance of solitary or multiple masses [13]. In our study, fine-needle aspiration cytology did not help with the diagnosis of metastasis of thyroid gland; the accuracy of fine-needle aspiration cytology is heavily reliant on the experience of the clinician performing the analysis and their ability to apply strict diagnostic criteria [4]. Specifically, it is difficult to establish a correct differential diagnosis for primary anaplastic carcinoma of the thyroid gland and thyroid metastasis of poorly differentiated primary tumors [4]. Additionally, the usefulness of immunohistochemical staining for thyroglobulin is limited, because it is detected in only 20–30% of anaplastic carcinomas. Therefore, fine-needle aspiration cytology should be considered as a secondary means of diagnosis rather than a definitive diagnostic tool [2, 14, 15]. In our case, the thyroid nodules were diagnosed as papillary carcinomas based on thyroid ultrasound, because thyroid metastasis from the primary breast cancer was not observed by specific findings in imaging studies.

Thyroid metastasis of a primary cancer is usually considered as a systemic disseminated disease with a generally poor prognosis [14]. Survival following a diagnosis of thyroid metastasis varies depending on the site of the primary cancer. The overall survival of breast cancer, renal cell carcinoma and uterine cancer ranges from 21 to 66 months, while that of lung cancer and melanoma is 1–12 months [3, 13]. There are no definitive conclusions regarding the clinical effect of surgical resection in patients with thyroid metastasis. In the

absence of metastasis to other organs excluding thyroid metastasis, thyroid resection is indicated, and early diagnosis and aggressive treatment appears to improve survival [14]. In our case, the patient's cancer had metastasized to the thyroid gland and cervical lymph nodes. The patient also had a primary papillary thyroid cancer, for which thyroid surgery was performed. The patient received chemotherapy with docetaxel plus doxorubicin according to the following regimen: doxorubicin 50 mg/m² and docetaxel 60 mg/m², repeated every 3 weeks for a total of 6 cycles along with radiotherapy.

Conclusions

Although the thyroid gland is an uncommon site of metastasis, physicians should be aware of the possibility of metastatic disease in patients with a previous history of malignancy.

Disclosure Statement

The authors have no conflict of interests to declare.

References

- 1 WHO: Breast cancer: Prevention and control. 2012.
- 2 Rosen IB, Walfish PG, Bain J, Bedard YC: Secondary malignancy of the thyroid gland and its management. *Ann Surg Oncol* 1995;2:252–256.
- 3 Czech JM, Lichtor TR, Carney JA, van Heerden JA: Neoplasms metastatic to the thyroid gland. *Surg Gynecol Obstet* 1982;155:503–505.
- 4 Gandhi A, Banerjee SS, Bhatti WA, El-Tereifi H, Bundred NJ: Carcinoma of the breast presenting as a thyroid mass. *Eur J Surg* 1997;163:871–873.
- 5 Shin HW, Jang HW, Park JY, Chung JH, Min YK, Lee MS, Lee MK, Kim KW, Kim SW: Clinico-pathologic characteristics of the primary thyroid cancer in patients with breast cancer. *J Korean Endocr Soc* 2009;24:240–246.
- 6 Chalmers LJ, Benjamin B: High incidence of breast cancer in thyroid cancer patients. *Br J Cancer* 1966;20:670–675.
- 7 Tanaka H, Tsukuma H, Koyama H, Kinoshita Y, Kinoshita N, Oshima A: Second primary cancers following breast cancer in the Japanese female population. *Jpn J Cancer Res* 2001;92:1–8.
- 8 McTiernan A, Weiss NS, Daling JR: Incidence of thyroid cancer in women in relation to known or suspected risk factors for breast cancer. *Cancer Res* 1987;47:292–295.
- 9 Harris M, Howell A, Chrissohou M, Swindell RL, Hudson M, Sellwood RA: A comparison of the metastatic pattern of infiltrating lobular carcinoma and infiltrating duct carcinoma of the breast. *Br J Cancer* 1984;50:23–30.
- 10 Allegra JC, Lippman ME, Thompson EB, Simon R, Barlock A, Green L, Huff KK, Do HM, Aitken SC: Distribution, frequency, and quantitative analysis of estrogen, progesterone, androgen, and glucocorticoid receptors in human breast cancer. *Cancer Res* 1979;39:1447–1454.
- 11 McGuire WL, Horwitz KB, Pearson OH, Segaloff A: Current status of estrogen and progesterone receptors in breast cancer. *Cancer* 1977;39:2934–2947.
- 12 de la Monte SM, Hutchins GM, Moore GW: Estrogen and progesterone receptors in prediction of metastatic behavior of breast carcinoma. *Am J Med* 1984;76:11–17.
- 13 Lam KY, Lo CY: Metastatic tumors of the thyroid gland: A study of 79 cases in Chinese patients. *Arch Pathol Lab Med* 1998;122:37–41.
- 14 Nakhjavani MK, Gharib H, Goellner JR, van Heerden JA: Metastasis to the thyroid gland. A report of 43 cases. *Cancer* 1997;79:574–578.
- 15 Smith SA, Gharib H, Goellner JR: Fine-needle aspiration. Usefulness for diagnosis and management of metastatic carcinoma to the thyroid. *Arch Intern Med* 1987;147:311–312.

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Fig. 1. Thyroid ultrasound finding. Diffuse heterogenous low echogenicity of the thyroid gland, suggesting diffuse parenchymal disease. 0.9-cm sized, malignant looking nodule at the left thyroid.

Fig. 2. Gross finding of the thyroid specimen. **a** Right thyroid lobe. **b** Left thyroid lobe.

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Fig. 3. **a** The infiltrating carcinoma occupies the stroma and small vascular spaces (HE stain. $\times 200$). **b** Immunostaining for TTF-1 is negative in the neoplastic cells infiltrating the stroma and filling the vascular spaces, but positive in the thyroid follicle cells (TTF-1. $\times 100$). **c** The thyroid shows a papillary carcinoma with extrathyroidal extension (left side), and an another carcinoma infiltrating the thyroid stroma (right side) (HE stain. $\times 40$).