CASE REPORT / ПРИКАЗ БОЛЕСНИКА

Thyroid gland metastasis from breast cancer – a rare case report and literature overview

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SUMMARY
Introduction The thyroid gland is a rare site for metastatic lesions from non-thyroid cancers. Due to the fact that achieving a diagnosis of thyroid gland metastasis from breast cancer prior to operation is challenging, the diagnosis thereof is mainly based on a pathological biopsy and immunohistochemical staining. The aim of this study was to present a rare case of thyroid gland metastasis from lobular breast cancer.
Case outline The patient was a 33-year-old female who had already had a five-year history of lobular cancer of the right breast and was thereafter found to have two suspicious tumors in the left breast, as well as a thyroid mass diagnosed as metastatic breast carcinoma.
Conclusion Patients who have a thyroid lesion and a history of malignancy are at a higher risk for metastasis and require additional caution during diagnosis and treatment.
Keywords: thyroid metastasis; breast cancer, diagnosis, treatment; histopathological analysis

INTRODUCTION

Although the thyroid gland is richly supplied with blood, the occurrence of a secondary malignancy of the thyroid gland is relatively rare. According to the literature of clinical papers, the incidence of a secondary malignancy of the thyroid gland is low, representing 2–3% of all malignant tumors of the thyroid gland [1]. However, the most common among metastasizing cancers related to this gland are melanoma, as well as kidney, breast, and lung cancer [2].

In autopsy series, the lung is the most common site of primary tumor metastatic to the thyroid, whereas in clinical series, renal cell carcinoma is the most frequent, followed by breast and gastrointestinal neoplasms [3]. According to Nixon et al. [4], the high oxygen and iodine environment may impair the ability of metastatic cells to settle and develop in the thyroid. Additionally, the fast blood flow could make adhesion and implantation of tumor cells difficult.

In this paper, a rare case of breast carcinoma metastatic to the bilateral thyroid lobes is presented. The thyroid metastasis appeared five years after the initial diagnosis of breast carcinoma in the right breast and was confirmed by histopathological analysis. After the surgery, it was also found that the patient had two new lobular breast carcinomas in the left breast. The patient was not found to have any other distant metastases.

CASE REPORT

The patient, a 28-year-old female, underwent a nipple areola-sparing mastectomy and primary breast reconstruction for right breast carcinoma in 2011 at the Institute for Oncology and Radiology of Serbia.

On histopathological examination, it was diagnosed as lobular carcinoma of the breast. The primary tumor was 52 × 22 × 20 mm in size and nine axillary lymph nodes showed a tumor deposit (9/10). Immunohistochemically, the tumor was positive for estrogen receptors (ER) and progesterone receptors (PR). The Ki67 marker was at 50% and negative for HER-2-neu. The patient then underwent adjuvant chemotherapy, endocrine therapy, and radiotherapy, and was followed up on every six months. The disease was asymptomatic for five years. After this time, two tumors in the left breast were found to be suspicious after clinical examination and MRI. Ultrasonography of the neck also showed a suspicious neoplastic lesion in the bilateral thyroid lobes.

According to subsequent testing, while the patient was euthyroid (serum TSH, fT4, and fT3 in the normal range), thyroglobulin level was elevated (98.6 ng/ml; normal: 1.4–78 ng/ml). Serum Ca 15.3 was elevated to a slightly higher level of 32.7 kU/L (normal: 0–25 kU/L). The patient was asymptomatic.

Histopathological examination of the left breast after surgery showed two lobular breast carcinomas of the breast, (12 × 10 × 9 mm and 18 × 8 × 6 mm in size, respectively) and negative sentinel lymph nodes (0/2). Both tumors also expressed positive receptors for ER, PR and negative ones for HER-2-neu, and had the same Ki67 of 40%. The total thyroidectomy revealed a metastatic lobular carcinoma of the breast in the bilateral thyroid lobes. Nine neck lymph nodes showed a tumor deposit (9/14) after the
right modified radical neck dissection and extirpation of the lymph nodes in the central region of the neck.

Tumor cells in the metastatic foci (Figure 1) were also positive for ER (Figure 2) and PR (Figure 3), but negative for HER-2-neu. They were, however, positive for mammaglobin (Figure 4), GCDFP-15 (Figure 5), confirming their origin from breast. Furthermore, the metastatic cells were negative for thyroglobulin (Figure 6), TTF-1 (Figure 7), and CK7; in the surrounding normal thyroid parenchyma, they were all positive, suggesting that neoplastic cells did not originate from the thyroid gland.

After the surgery, testing showed TG and CA 15-3 to be in their normal ranges.
The metastasis to the thyroid gland occurred five years after the original diagnosis of the primary disease. The thyroid deposits were the only distant metastasis.

DISCUSSION

The thyroid gland is a rare site for metastasis to develop, and an infrequent location for metastatic lesions to appear [5, 6, 7]. Since it is a challenge to diagnose a thyroid gland metastasis in breast cancer prior to the actual operation, the diagnosis itself is mainly based upon a pathological biopsy and immunohistochemical staining.

According to the literature, the involvement of the thyroid generally becomes apparent either simultaneously or anywhere in the range from a few months to 14 years after the original diagnosis of the primary tumor [1, 8–15]. The long interval between the original primary tumor and subsequent thyroid metastases presents a diagnostic problem. In this case, we made the diagnosis five years subsequent to the history of the primary tumor.

Metastatic disease involving the thyroid is generally observed in elderly individuals in their sixth and seventh decade of life [16]. However, the presently analyzed female patient was only 33 years old. Therein, it may be common for the clinical manifestation of metastatic disease to have no importance, as was in the presented case. In this regard, CA 15-3 and ultrasonography of the neck played a major role in the diagnostic process.

Although thyroid metastases from breast cancer are uncommon, the routine use of fine-needle aspiration may better assist in its more frequent detection due to its ready ability to confirm a clinical suspicion [6, 14]. Total thyroidectomy is recommended for patients with metastatic cancer limited to the thyroid because of the multifocality of metastases to the thyroid gland [17]. Our patient therefore underwent total thyroidectomy and nine neck lymph nodes showed a tumor deposit (9/14).

In the reported case, the diagnosis of metastatic breast carcinoma to the thyroid was confirmed with the help of histopathology and immunohistochemistry. The latter was particularly helpful in differentiating metastatic breast carcinoma from primary thyroid malignancy. Thyroglobulin, TTF1, and CK7 are tumor markers that are positive in thyroid follicular epithelial cells. In the presented case, all of these markers were found to be negative in the tumor cells, but strongly positive in the surrounding normal thyroid parenchyma. Furthermore, the tumor cells tested strongly positive for mammaglobin and GCDFP-15, confirming their origin from a breast lesion [18, 19]. The hormonal status (ER and PR) were found to be positive, and HER-2-neu was negative in the metastatic tumor, similar to the expression pattern of the primary breast carcinoma.

It may be concluded that a patient with a thyroid lesion and a history of malignancy is at a higher risk for metastasis. Such a patient therefore requires additional caution during their diagnosis and treatment. One method of screening is to pay specific attention to the elevated CA 15-3 levels after surgery of the primary breast carcinoma. It is also, therefore, advisable to do a fine-needle aspiration, which may help detect metastasis in future cases.

REFERENCES


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