BREAST CANCER METASTASIS TO THE THYROID GLAND: A RARE CASE REPORT WITH DIAGNOSTIC DILEMMA

Surgery

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ABSTRACT

Introduction: Metastasis to thyroid gland is very rare; with breast cancer metastasizing to thyroid is extremely rare. Here, we report a case of metastatic lesion in the thyroid from breast carcinoma in a 43 year old female who presented to us with a right breast lump for 1.5 years along with thyroid swelling for 6 months. **Results:** FNAC of breast lump showed ductal carcinoma while FNAC of thyroid nodule was inconclusive. CECT showed right breast neoplasm with malignant deposits in isthmus of thyroid. She underwent right simple mastectomy with axillary clearance and total thyroidectomy followed by chemotherapy. Histopathology analysis showed invasive ductal carcinoma in isthmus of thyroid. This was confirmed by immunohistochemistry, which revealed positive for GATA-3 and negative for TTF1 and Calcitonin. **Conclusion:** This case report highlights the importance of a correct early diagnostic work up. Immunohistochemical panels are helpful in differentiating between primary and secondary tumors. Also, thyroidectomy may be beneficial for local disease control and prevent the potential morbidity of tumor extension related to airway.

KEYWORDS

Breast cancer, Metastasis, Ductal carcinoma, Secondaries, Thyroid gland, Immunohistochemistry

INTRODUCTION:

Breast cancer is the most commonly diagnosed cancer among women¹. Bone is the most common site of breast cancer metastasis followed by lungs, pleura, liver and brain². Metastasis to the thyroid gland from the extra thyroidal primary is rare and accounts for 1-3% of thyroid surgically removed for suspected malignancy³. Of this small number, the most frequently reported primary tumor is renal cell carcinoma, followed by colorectal, lung, and breast carcinoma, sarcoma, and melanoma².

Metastasis to the thyroid is rare. However, ductal breast cancer metastasizing to thyroid is exceedingly rare. In this paper, we report a case of metastatic lesion in the thyroid from the breast carcinoma which was inconclusive in fine needle aspiration cytology (FNAC) and confirmed by post-operative histopathology and immunochemistry.

Case History:

(a) Clinical Case:

A 43 year female came to the Out Patient department with complaints of lump in the right breast since 1.5 years along with swelling in the thyroid for six months. Her past medical history revealed hypothyroidism and was on Tablet Eltroxin. After evaluation, she was found to be hypertensive and was started on antihypertensives.

(b) Clinical examination:

She was clinically very pale and thin built. Right axillary- anterior & apical group of lymph nodes were palpable. Breast examination revealed single 5 X 5 cm lump palpable in right upper & inner quadrant and involving nipple areola complex. It had irregular margins, hard in consistency and was fixed to the chest wall with retracted nipple. Other breast was found to be normal. Thyroid examination revealed a 3 x 3 cm swelling noted in midline of neck, hard in consistency with uneven surface and irregular margins.

(c) Management:

After admission to the hospital, USG of neck revealed that multiple hyperechoic lesions were noted along with increased vascularity possibility of neoplastic etiology. The fine-needle aspiration cytology (FNAC) of breast lesion revealed ductal carcinoma while twice FNAC of thyroid lesion was inconclusive. Staging investigations included CT Neck & Thorax which showed right breast neoplasm with cervical lymph nodes involvement, with hepatic & vertebral metastasis, possibility of malignant thyroid lesion involving isthmus. Since the diagnosis was not very clear, following a multidisciplinary team

discussion, she underwent right simple mastectomy with axillary clearance and total thyroidectomy along with split skin grafting over the raw breast area in the same sitting followed by chemotherapy sessions.

Microscopy:

Multiple sections showed from right thyroid lobe shows features suggestive of follicular adenoma with lymphocytic infiltration while the left thyroid lobe shows lymphocytic thyroiditis. Multiple sections from isthmus showed varying size of colloid filled follicles in which sheets of cells seen. The cells in the sheet are polygonal, having a high N/C ratio, hyperchromatic, coarse chromatin, prominent nucleoli with scanty cytoplasm. Focal comedonecrosis and mitotic activity was seen. Overall histological features of were suggestive of invasive duct carcinoma of breast in isthmus along with right lobe follicular adenoma and lymphocytic thyroiditis.

Figure 1: H and E stains showing:

a: Histologic section from metastatic lesion in the thyroid isthmus from breast cancer (H & E stain)

b: Histologic section from breast showing infiltrating ductal carcinoma (H & E stain)

Figure 2: IHC analysis of the thyroid showing the tumor cells stained:

a. IHC: GATA3 (+)

b. TTF1 (-)

DISCUSSION:

Till date, to the best of the data available, there are very few case reports available where a patient presented with a metastatic ductal carcinoma in the thyroid without a prior diagnosis of breast cancer. Metastases from breast to the thyroid are uncommon, although cases of metastatic disease involving the thyroid have been reported in the literature^{5,6,7,8}.

In our case, the patient presented initial metastasis of invasive ductal carcinoma without a prior diagnosis of breast cancer. In the cases reported in the literature, all secondary thyroid tumors had been diagnosed after a primary breast cancer and the time to detection of thyroid metastasis after a primary breast cancer was more than 1 year in the aforesaid reported cases^{7,8,9}.

FNAC is the investigation of choice in the work-up of thyroid nodules. It has been shown to achieve an accuracy of over 90% in the diagnosis of secondary tumors of the thyroid^{9,10}. Unfortunately, as in the case presented, FNAC from the thyroid nodule was done twice but was inconclusive both the times. This diagnostic mystery was solved by immunohistochemistry. It is important to distinguish metastatic disease from the more common primary thyroid malignancy which forms the basis of management. Making a correct diagnosis, timely influences the prognosis and the likelihood of a cure for lesions of the thyroid gland, and the treatment strategy used to control metastatic breast carcinoma is different from that used to treat primary thyroid malignancies.

To ascertain metastatic breast carcinoma in the thyroid gland, immunohistochemistry must be utilized for the detection of specific markers. Clinically, ER, PR and HER2/neu statuses are known to be correlated with breast cancer. In this study, immunohistochemical staining of the ER, PR and HER2/neu in thyroidectomy specimen was done and they all demonstrated a similar expression pattern with primary breast carcinoma; negative for ER and PR, and strongly positive for HER2/neu. Furthermore, Thyroglobulin and TTF-1 are the functional markers for medullary thyroid carcinoma, and serves a useful tool to distinguish breast metastatic lesions from primary thyroid lesions. The normal thyroid follicular cells, but not malignant cells, are stained strongly for TG and TTF-1, which confirms that lesions are not thyroid in origin.

In our case, the diagnosis of invasive ductal carcinoma was made with the immunohistochemical markers, specifically positive expression of hormone receptors related to breast cancer. The E-cadherin positive immunoreactivity distinguishes ductal from lobular carcinoma. The expression of GATA3 is a sensitive and specific labeling of breast cancer and is more sensitive than mammaglobin, which was negative in our case¹⁸. Thus, the combined expression of GATA3, estrogen and progesterone receptors, and E-cadherin positivity on immunohistochemistry was compatible with the diagnosis of invasive ductal breast carcinoma. A diagnosis of primary thyroid and parathyroid malignancy was excluded by the immunohistochemical markers-thyroglobulin, TTF1 and calcitonin negativity. Hence, it is necessary to use a panel of immunohistochemistry markers along with clinical history of the patient for making a correct and timely diagnosis.

CONCLUSION:

Along with clinical history and examination of the patient, immunohistopathological analysis should be performed to confirm the diagnosis of metastatic breast cancer. These immunohistochemical panels play an important role in differentiating between primary and secondary tumors. Thyroid metastases specifically breast cancer, are rare. Despite the rare presentation, this case reminds the importance of the diagnosis of metastasis using an immunohistochemistry panel and appropriate imaging. Also, thyroidectomy may be beneficial for local disease control and prevent the potential morbidity of tumor extension related to airway.

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