Breast Metastasis from Follicular Variant of Thyroid Carcinoma: A Delayed and Rare Complication

[1]Tapati Mandal, [2]Shahnaj Hossain Dinu, [3]Pupree Mutsuddy, [1]Papia Akhter, [4]Md. Abu Bakker Siddique, [7]S M Arifur Rahman, [5]Fatima Begum and [6]Shamim MF Begum

[1]Assistant Professor and Senior Medical Officer, National Institute of Nuclear Medicine & Allied Sciences (NINMAS), BSMMU
[2]Resident surgeon, Department of Radiology and Imaging, NITOR, Dhaka
[3]Associate Professor and Principal Medical Officer, 4. Professor and Chief Medical Officer, 5. Professor and Ex-Director, NINMAS
[6]Professor and Ex-Member, Planning, BAEC
[7]Medical Officer, NINMAS

Correspondence Address : Dr. Tapati Mandal, Assistant Professor and SMO, NINMAS, Block-D, BSMMU campus. Shahbag, Dhaka-1000
Email: tapatinm@gmail.com

ABSTRACT

Thyroid carcinoma is typically indolent and has a favorable prognosis when compared to other types of cancer. In advanced stages of thyroid cancer, distant metastases are typically appearing in the lungs, bones, and lymph nodes. Thyroid cancer breast metastasis is extremely rare. A case of follicular variant of papillary thyroid carcinoma (FVPTC) has been reported in this context, which was manifested as low FDG avid soft tissue density lesions in breast in a whole body PET-CT scan 4 years after thyroidectomy for papillary thyroid carcinoma (PTC) in a 46-year-old woman. The lesions were suspected as metastatic, which were confirmed through histopathology.

Keywords: Breast metastasis, Follicular variant of papillary thyroid carcinoma, ^{18}F FDG PET-CT

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INTRODUCTION

Metastases to the breast from thyroid carcinoma are rare occurrences. Papillary thyroid carcinoma (PTC) predominantly affects regional lymph nodes in the neck, with less frequent spread to distant locations like the lungs and bones. While metastases to distant organs can happen, breast metastases are infrequent and typically represent an unusual manifestation of thyroid carcinoma (5). ^{18}F-FDG PET-CT scan is not a routine procedure to detect the metastases from FVPTC. In cases of thyroglobulin (TG)-elevated negative iodine scan (TENIS) PTC, where elevated TG levels indicate persistent or recurrent disease despite a negative radioactive iodine (RAI) scan, PET-CT is a superior diagnostic modality. PET-CT, particularly using ^{18}F-FDG, can identify metabolically active lesions that are not RAI-avid, providing precise localization of occult metastatic disease. This enables early detection, accurate staging, and better treatment planning in TENIS cases, emphasizing its critical role in the management of atypical metastatic patterns like breast involvement.

CASE REPORT

A 46-year-old woman underwent total thyroidectomy four years ago for follicular variant of PTC, Stage II (T2N0M0). Two months after surgery, she was treated with radioactive iodine therapy (RAIT) with dose of 100 mCi followed by L-thyroxine suppressive therapy. Biomarker for thyroid carcinoma, serum thyroglobulin (Tg) showed significant improvement after the ablation therapy with evidences of gradual reduction from 179 ng/ml to 4.81 ng/ml. After two years, there was progressive rise of patient's serum Tg while on daily suppressive L-thyroxine doses. There was no definite clue in large dose radioiodine scan and the patient received another empirical RAIT with a dose of 100 mCi of 131I, and the post therapy whole body scan (RxWBS) was reported negative. However, serum Tg levels remained high reaching a level of 71 to104 ng/ml within next nine months despite continuing L-thyroxine therapy. A whole body ^{18}F-FDG PET-CT scan was done to rule out iodine non-avid metastasis, which revealed multiple, low FDG avid, small, soft tissue density lesions in the right breast, along with hypermetabolic variable-sized pulmonary nodules in both lungs. CT guided FNAC/core biopsy investigation was suggested for the lung and breast nodules in order to look for metastases from

FVPTC. The attempted core biopsy from lung was failed but core biopsy from breast lesion showed metastatic papillary carcinoma. The patient was scheduled to start the oral tyrosine kinase inhibitor (TKI) treatment.

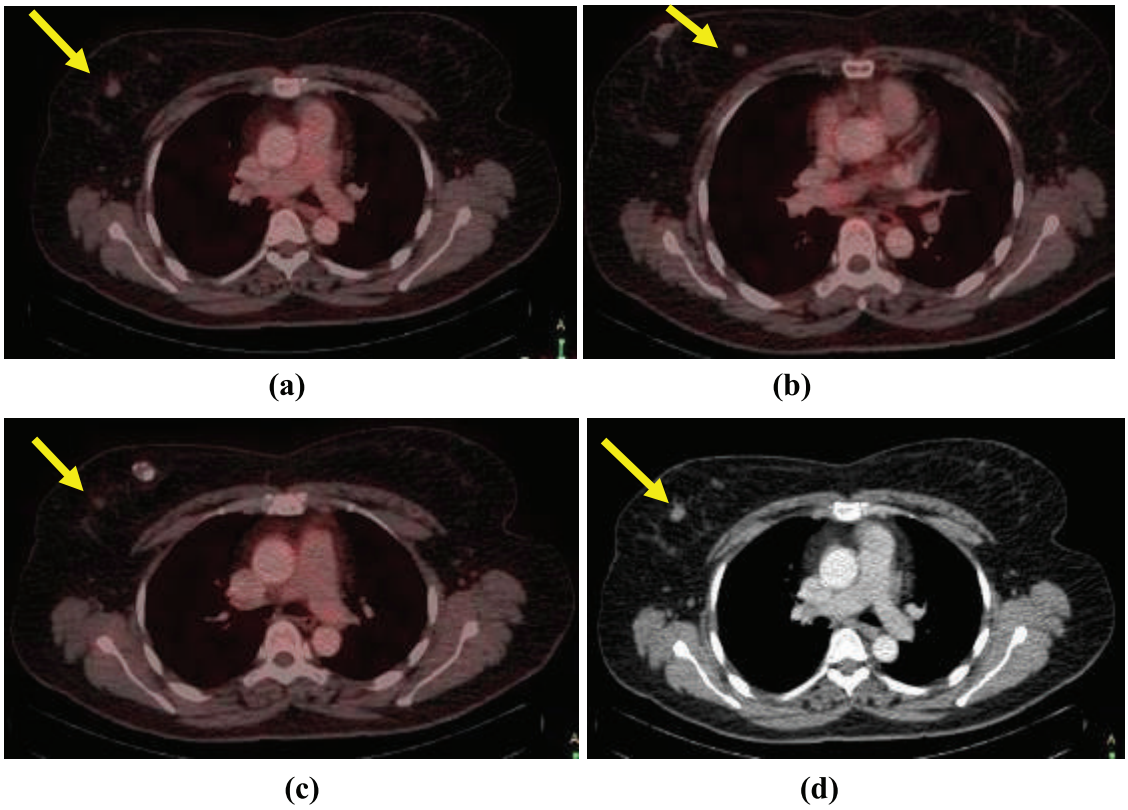

Figure 1: Axial view of PET-CT (a, b, c) and CT scan (d) showing multiple breast nodules (yellow arrow)

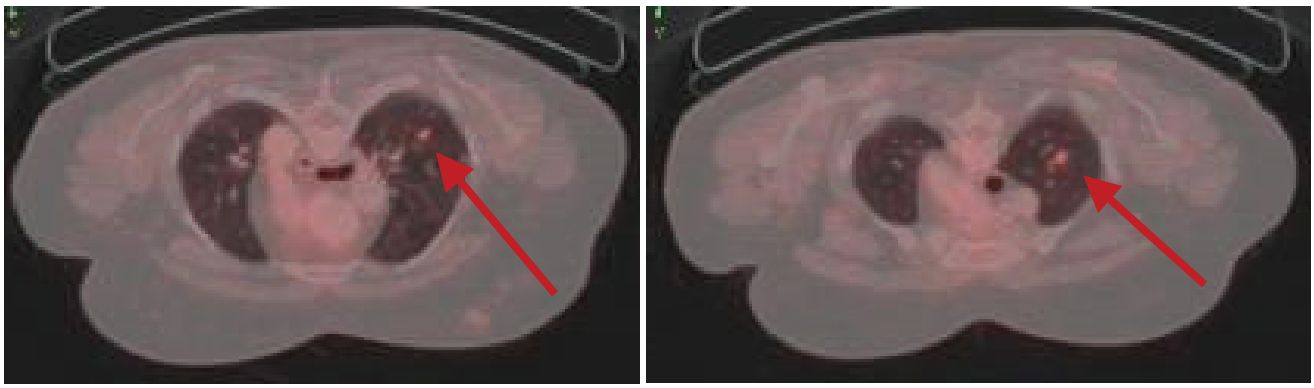

Figure 2: PET-CT scan axial view showing low FDG avid pulmonary nodules (red arrow).

DISCUSSION

Metastasis of FVPTC to the breast is indeed rare, with only a few reported cases worldwide (1, 4, 5, 7). The follicular variant of papillary thyroid carcinoma is the most common type of well-differentiated thyroid cancer, accounting for 90% of all cases (2). The usual metastatic sites from PTC are the lung, bone, and lymph nodes (3). Breast metastasis from FPTC is rare because differentiated thyroid carcinoma is usually slow-growing and indolent. When such metastases do occur, the breast lesions are typically small, measuring sub-centimetric to centimetric in size, reported as delayed onset, and may be associated with other systemic metastases as observed in this case (4). A documented case of breast metastases occurring 12 years after thyroidectomy and radioiodine therapy, emphasized the prolonged latency often observed with such metastases (6).

Breast metastases from thyroid carcinoma likely occur via hematogenous dissemination. Unlike primary breast malignancies, these metastatic lesions are often painless, lack calcifications, and may mimic benign lesions radiologically. In the presented case, there were no breast-related complaints such as mastalgia, palpable lumps, or any other localized symptoms. This asymptomatic presentation is consistent with the literature, where metastatic breast lesions from thyroid carcinoma are often clinically silent (7). Additionally, the initial histopathological report (HPR) of the thyroid revealed no evidence of angiolymphatic invasion, extrathyroidal extension, or encapsulation, factors often associated with aggressive behavior in thyroid carcinomas (8). The absence of these features further underscores the unpredictable nature of metastatic spread in FVPTC.

Advanced imaging techniques, such as 18F-FDG PET-CT, play a pivotal role in detecting non-iodine avid metastases. Histopathological and immunohistochemical studies are crucial for differentiation as reported in several cases of FVPTC metastasizing to the breast, giving emphasis on the need for histopathological correlation (10, 11).

It is important to know whether the breast lump is a primary or secondary tumor (metastasis), as this affects the treatment plan. For example, in this case, the primary tumor was in the thyroid gland, while the metastasis is in the breast. Major surgery of the breast, such as mastectomy, is not indicated (6, 11).

While PTC usually has a good prognosis, the presence of distant metastases can complicate the management and may require more aggressive treatment approaches (2, 9). 18F-FDG PET/CT scan has a potential role to identify such rare instances and guide for better management (1).

CONCLUSION

The present case emphasizes how crucial it is to take into account the risk of follicular variant PTC-related breast metastases in individuals who have a history of thyroid cancer and a suspicious breast lump. For the purpose of detecting and staging PTC breast metastases, 18F-FDG PET-CT may provide valuable information. Oral TKI therapy can be an effective treatment option for this rare condition.

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