CASE REPORT

Isolated Metastasis in Male Breast from Differentiated Thyroid Carcinoma – Oncological Curiosity. A Case Report and Review of Literature

Lakshminarasimman Parasuraman¹ · Shubhada V. Kane² · Prathamesh S. Pai¹ · Kintan Shanghvi²

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Abstract Papillary carcinomas are the most common thyroid malignancy accounting for approximately 80 % of thyroid cancers (Rosenbaum and McHenry Expert Rev Anticancer Ther 9:317–329, 2009). They generally manifest as solitary nodules in the thyroid with or without cervical lymphadenopathy. Distant metastases though rare, are commonly seen in lungs and bones, other rare sites are parotid, skin, brain, ovary, adrenal, kidney, Pancreas and breast. We herein present an unusual case of breast lump as an initial presentation of a well differentiated thyroid cancer in a male patient. Our case is unique since it presented with isolated breast metastasis in a male patient in the absence of primary diagnosis. This prompted us to report the case with review of literature. A brief review of literature follows.

Keywords Papillary carcinoma · Isolated metastasis · Breast metastasis.

Case Report

A 46-year-old male had presented to an outside hospital with a palpable painless swelling in left chest close to nipple since 5 months measuring 3 × 3 cm. He had undergone excision biopsy (without a preoperative tissue diagnosis) at the same institute. Histopathology report suggested infiltrating ductal carcinoma of breast without DCIS (Ductal carcinoma in situ) component. He came to our institute for further management.

Outside histopathological slides were reviewed that revealed infiltrating carcinoma resembling papillary carcinoma thyroid (Figs. 1 and 2). Immuno histochemistry showed that the tumour cells were positive for thyroid transcription factor (TTF1) and thyroglobulin (TG), negative for *Surfactant protein B (SPB)*, gross cystic disease fluid protein (GCDFP), Estrogen and Progesterone receptor (ER,PR), CerbB2. Figure 3 suggested the possibility of a thyroid primary.

On examination, patient was hypothyroid and had a palpable solitary thyroid nodule. On further evaluation, neck ultrasound (US) showed multifocal, echo genic nodule with micro calcification in both lobes of thyroid. The largest nodule was in the left lobe of thyroid measured 3.5 cm in maximum dimensions with left sided cervical lymphadenopathy. The result of FNA cytology revealed papillary carcinoma thyroid (PTC). The patient underwent total thyroidectomy with bilateral central and lateral compartment lymph node dissection.

Histopathology demonstrated multifocal follicular variant papillary carcinoma thyroid (FVPCT) with extra thyroidal extension measuring 4.3 cm in maximum dimension. There were multiple nodes from central and lateral compartment which showed metastasis with perinodal extension and lymphovascular emboli (Fig. 4). Large dose I¹³¹ scan showed uptake in neck with no evidence of distant metastasis. He was then treated with radioiodine to a dose of 409 mCi. During follow up, he is found to be free of disease.

✉ Shubhada V. Kane
drsvkane@gmail.com

Lakshminarasimman Parasuraman
lakshminarasimmanp@gmail.com

Prathamesh S. Pai
drpspai@gmail.com

Kintan Shanghvi
drkintan@gmail.com

¹ Department of Surgical Oncology (Head & Neck), Tata Memorial Hospital, Mumbai 400 012, India

² Department of Pathology, Tata Memorial Hospital, Mumbai 400 012, India

Fig. 1 Low power view shows tumor in breast composed of compactly arranged follicles filled with colloid. (H&E $\times 100$)

Fig. 4 High magnification view of thyroidectomy specimen shows histology of follicular variant of papillary carcinoma. Note characteristic nuclear features (H&E $\times 400$)

Fig. 2 Higher magnification shows neoplastic follicles lined by atypical follicular cells. Note characteristic nuclear features of papillary thyroid carcinoma. (H&E $\times 400$)

Fig. 3 Immunohistochemical characteristics. **a** Positive reaction for TTF-1 ($\times 200$). **b** Positive reaction for TG ($\times 200$). **c** Positive reaction for HBME1. **d** Negative reaction for GCDFP15 ($\times 200$)

Discussion

Papillary carcinoma thyroid is the most common endocrine malignancy and regional metastasis to cervical lymph nodes is common. Rare site metastasis at presentation is known to occur in poorly differentiated and undifferentiated thyroid cancer and not so common in differentiated thyroid cancer. Distant metastases in differentiated thyroid carcinoma occur in 4–23 % of cases, with only 4 % patients present with distant metastases as initial presentation [2, 3].

Lung, bone, and central nervous system are the most common site of distant metastasis. Rarely, metastasis to skin, liver, kidney, pancreas, muscle, breast, eye, are reported in literature. In our hospital, a tertiary care centre we have seen metastasis at the above mentioned sites except breast (male).

Response to treatment depends on the site of metastasis and the age of the patient. Age more than 45 years and extra

Table 1 Review of literature

Author	Age/Sex	Histology	Treatment of primary	Metastasis (time from primary diagnosis)	Site	Treatment of metastasis
Yahya Al-Abed	77/F	Hurtle cell carcinoma	Total thyroidectomy + bilateral neck dissection + radiotherapy	10 months later	Left breast	Excision
Angeles-Angeles A	58/F	Papillary carcinoma	Total thyroidectomy + bilateral neck dissection	20 years	Left breast	Excision
Reginald C. Chisholm	75/F	Follicular carcinoma	Near total thyroidectomy + right radial neck dissection	9 years	Right breast	Excision
Loureiro MM	64/F	Papillary carcinoma	Total thyroidectomy	10 years	Right breast	Excision
Fiche M	59/F	Tall cell variant - PTC	Inoperable	2 months	Breast	NIL
Cristallini EG.	57/F	Follicular carcinoma	Thyroidectomy	15 years	Left breast	Excision

pulmonary metastases are associated with poor prognosis since the RAI- avidity decreases.

Pulmonary metastasis responds well to treatment as compared to extra pulmonary metastasis. Nixon et al. showed that out of 52 patients with distant metastasis, the 5 year (DSS) disease specific survival is in the range of 75 % vs 46 % for pulmonary and extra pulmonary metastasis respectively [4].

Bone is the second most commonly involved site after lungs [5]. Metastasis to bone is associated with increased mortality and poor survival with poor quality of life [6].

Liver metastasis in differentiated thyroid cancer is quite rare with limited case reports in literature (10 cases). Any solitary liver metastases which are amenable to surgical resection should undergo complete resection [7].

Metastasis to the breast from differentiated thyroid cancer is extremely rare. The incidence of metastatic cancer to the breast is approximately 1–2 %. Metastatic disease to breast usually occurs in upper outer quadrant and superficial in female breast. In our case it was superficial and in upper outer quadrant but in male breast [8].

BRAF mutation in papillary carcinoma thyroid is known for its association with poor outcome in terms of increased nodal metastasis, aggressive subtype, non-avidity to RAI treatment, recurrences and death [9].

Jing et al. analysis revealed that BRAF mutation was significantly lower in metastatic group as compared to non-metastatic group (28.6 % Vs 68.8 %). So BRAF mutation positivity may not be helpful in our patient presented with isolated distant metastasis [10].

Long term prognosis of patients with distant metastasis at presentation varies in the range of 50–60 %. Factors like age >45 years, extra-pulmonary metastasis, follicular histology are associated with poor outcome despite best possible treatment in the form of surgery and radioiodine ablation [4].

Since distant metastases are rare in differentiated thyroid cancer, no standard treatment protocol exists. They are treated based on merit of the individual cases. Surgical excision

followed by radio-iodine treatment is the treatment of choice whenever feasible.

In contrast patients with isolated metastasis undergoing adequate surgical resection have good prognosis as compared to those with multiple disseminated metastasis [11]. This case is yet another example of solitary metastasis with good prognosis responding to iodine treatment in differentiated thyroid cancer. Our patient is alive and without disease after 2 years of diagnosis and treatment.

At most care should be taken when such rare diagnosis are made, as in our case initial diagnosis was invasive breast carcinoma in a male patient. A FNA/ biopsy from the breast mass should have been the initial investigation before excising the whole mass, which was overlooked by the treating surgeon. In such rare cases immune-histochemistry and tumour markers play a significant role in making a definitive diagnosis.

In conclusion, isolated solitary metastatic breast disease from differentiated thyroid carcinoma at presentation is a rare entity. All other case reports mentioned in the literature are female patients. To our knowledge this seems to be the first case of male patient presenting with breast metastasis as initial presentation masquerading as male breast cancer.

A literature review for the above mentioned case report has been presented below in Table 1.

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