Case Report

A rare case of asymptomatic radioiodine-avid renal and brain metastases 20 years after hemi-thyroidectomy for adenomatous goiter

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ABSTRACT

A 65-year-old patient, with a history of left hemi-thyroidectomy for adenomatous goiter 20 years previously, was found to have pulmonary lesions on chest X-ray, a brain lesion on computerized tomography (CT), and elevated serum thyroglobulin (Tg). While completion thyroidectomy revealed that no pathological evidence of thyroid malignancy, radioiodine-avid pulmonary, brain, and renal and bone lesions were identified on diagnostic as well as posttherapy whole body planar scintigraphy and single photon emission computed tomography-CT. Subsequent ultrasonography-guided biopsy of a renal nodule showed thyroid follicular cells. This case suggests that metastatic differentiated thyroid carcinoma should be suspected in asymptomatic patients with incidentally detected lesions, raised serum Tg, and history of thyroid lesions.

Keywords: ^{131}I, brain, hemimegalencephaly, metastasis, renal, single photon emission computed tomography-computed tomography, thyroid cancerhemihypoperfusion

INTRODUCTION

Papillary and follicular carcinomas of the thyroid gland, commonly referred to together as differentiated thyroid carcinoma (DTC), are characterized by a slowly progressive course, and a 10-year survival rate as high as 80-95%.[1] Distant metastases are seen in a minority of the patients and the reported rates of occurrence range from 4% to 15%.[2] The most common site of distant metastases is the lung, followed by the bone.[3] Metastasis to the kidneys is uncommon.[4] We present a case of asymptomatic radioiodine-avid renal and brain metastases presenting 20 years after hemi-thyroidectomy for adenomatous goiter and identified with ^{131}I-whole body scintigraphy (WBS) and ^{131}I single photon emission computed tomography/computed tomography (^{131}I-SPECT/CT).

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CASE REPORT

A 65-year-old man, investigated at a different hospital for intermittent cough and white-colored expectoration for 4 months, was found to have multiple bilateral nodular lesions on a chest X-ray [Figure 1a] and a hyperdense lesion (arrow) in the right posterior parietal lobe of the brain on CT [Figure 1b]. There was no history of chest pain or fever. He had undergone left hemi-thyroidectomy 20 years previously, reportedly for adenomatous goiter. Since serum thyroglobulin (Tg) was >3000 ng/ml, a provisional diagnosis of metastatic DTC was made. Completion

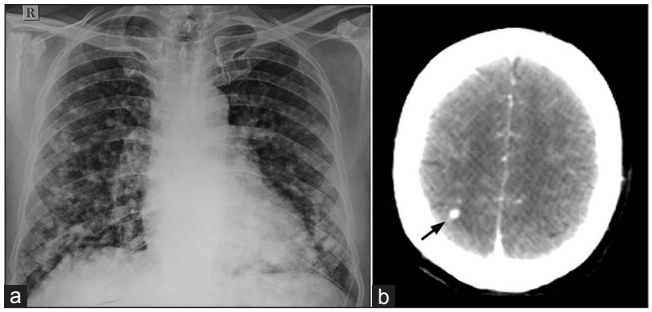

Figure 1: (a) Chest X-ray showing multiple nodular lesions in both lungs and (b) computerized tomography of the brain showing a hyperdense lesion (arrow) in the right posterior parietal lobe

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thyroidectomy revealed a nodular goiter with no pathological evidence of malignancy. However, abdominal ultrasonography (USG) showed multiple echogenic round lesions with areas of necrosis and internal vascularity in both kidneys.

^{131}I WBS [Figure 2a] and SPECT/CT [Figure 2b and c] performed 48 h after oral administration of 2 mCi ^{131}I showed tracer uptake in the head, neck (residual thyroid), bilateral hilar lymph nodes, right third and fourth ribs with lytic changes, lung nodules, S1/S2 spinal canal, right femur, acetabulum and humerus, and multiple exophytic renal nodules. USG-guided biopsy of a left renal nodule revealed only thyroid follicular cells (positive for Tg immunostaining) with no pathological evidence of malignancy. Postoperative investigations after 6 weeks showed Tg >3000 ng/ml, Anti-Tg 30.1 IU/ml, and thyroid stimulating hormone 14.28 IU/ml. Hematological, renal, and pulmonary function tests were within normal limits. He was treated with 207 mCi of ^{131}I under steroid cover (prednisolone 40 mg/day).

A fifth-day posttherapy whole body planar and SPECT/CT scan [Figure 3a and b] confirmed metastasis in the brain (arrow) and other sites seen in the pretherapy scan. After an uneventful hospital stay, he was discharged on a suppressive dose of thyroxin (225 μg/day).

DISCUSSION

Distant metastases from DTC may present after a latent period of many years.[4-8] Around 10% of the patients with DTC present with multiple sites of distant metastases other than lung, bone, and lymph nodes, 50% of which involve the brain, 25% the liver, and 25% other sites.[9] The reported incidence of renal involvement from a primary thyroid malignancy is very rare, being only about 4.5-5.9%, whereas of all secondary metastases to the kidneys from all cancers, thyroid cancer constitutes only about 2.5-2.7%.[10-12] So far, about 25 cases of renal metastases from DTC have been reported in the literature. Most of the subjects were female and older than 45 years of age,[2] whereas our patient was an elderly male. Renal metastasis usually appears in the setting of multifocal metastases, as in the present case. However, in our patient, no pathological evidence of malignancy was identified in any of the surgically resected thyroid specimens. It is possible that malignancy (most likely follicular thyroid carcinoma) might have escaped detection in the left hemi-thyroidectomy specimen 20 years earlier; a similar case has been reported previously.[13] Renal metastases from DTC are usually asymptomatic.[14] Apart from a recent onset of cough, our patient was asymptomatic in the presence of renal as well as bone and brain metastases. Metastases from DTC may develop several years (occasionally decades) after the removal of the primary thyroid malignancy. Furthermore, they may remain undetected for a long time if no radioiodine intervention is done.[14]

Since multiple iodine avid lesions were seen throughout the body on planar scintigraphy, a whole body SPECT/CT scan was performed for lesion localization. This helped in precisely localizing abnormal radioiodine uptake in the hilar nodes, lung nodules, kidneys, bone, spine, and brain. Brain metastases are usually poorly iodine-avid. However, our patient showed radioiodine uptake in the brain metastasis in the presence of radioiodine-avid residual thyroid, renal, and other metastases, which is extremely uncommon. Metastases to the brain are observed in only about 1% of the thyroid carcinomas and, in one study, 23% of the brain metastases were discovered only at autopsy. The median interval between the diagnosis of DTC and that of brain metastasis was 6.5 years.[15] However, the actual number of reported cases of brain metastases from thyroid carcinoma remains small, and there has been little evidence of benefit from any specific mode of therapy. The median disease-specific survival from diagnosis of brain metastases was

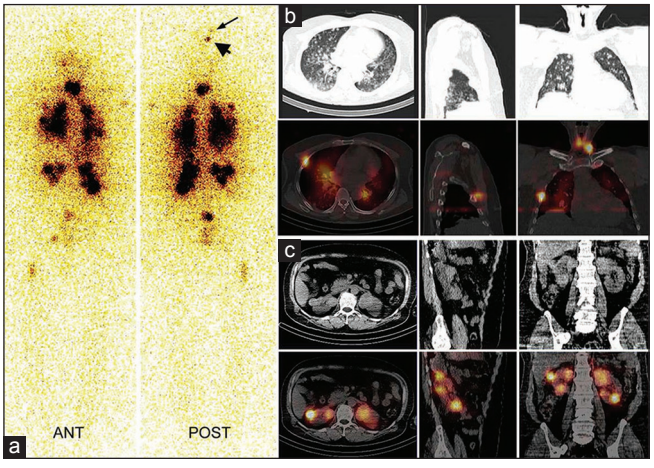

Figure 2: ^{131}I whole body scan (a) 48 h after administration of 2 mCi ^{131}I showing increased tracer uptake at multiple sites in the neck, chest, abdomen, pelvis and right thigh. A small focus of radioiodine uptake is seen on the right side of the head posteriorly (arrow), adjacent to a known focus of tracer contamination (arrowhead). Single photon emission computed tomography/computed tomography of the neck and chest; (b) Localizes tracer uptake to residual thyroid, bilateral hilar lymph nodes, right 3rd and 4th ribs with lytic changes and multiple lung nodules. Single photon emission computed tomography/computed tomography of the abdomen; (c) Shows tracer uptake in multiple exophytic renal nodules

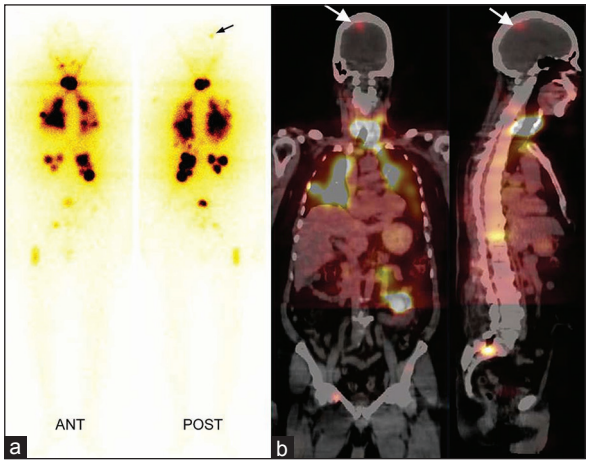

Figure 3: Whole body planar (a) and single photon emission computed tomography/computed tomography (b) scans 5 days after 207 mCi ^{131}I showing increased tracer uptake in the brain (arrow), D11 vertebra, sacrum, and right acetabulum, in addition to residual thyroid and lungs

16.7 months for patients who underwent local excision of one or more brain metastases, compared with 3.4 months for those who did not ($P < 0.05$).[15]

Our patient had metastatic involvement in multiple organs, which were not amenable to surgery. Hence, we treated the patient with high dose oral radioiodine under steroid cover. The patient's condition improved symptomatically with absence of any cough during the 2 months following iodine treatment; he is currently doing well under regular follow-up.

To conclude, metastatic DTC should be suspected in asymptomatic patients with incidentally detected lesions, raised serum Tg and history of thyroid lesions.

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