

Adrenal Metastasis from a Primary Papillary Thyroid Carcinoma

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Abstract

Distant metastases of a papillary thyroid carcinoma (PTC) is rare, and usually involves the lung or the bones. Adrenal metastasis of a PTC has been described only in three patients. We describe a 74-year-old woman with adrenal metastasis of a PTC, detected with a total body iodine scan and a PET-CT scan.

Key words: papillary thyroid carcinoma, adrenal metastasis, total body iodine scan, PET-CT

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Introduction

Thyroid carcinoma is a rare malignancy in humans, but it is the most frequent endocrine cancer except for ovarian cancer, accounting for 5% of thyroid nodules. The incidence of thyroid carcinoma has increased over the past 3 decades, occurring predominantly in women (1-3). The predilection for women is poorly understood; we could not find any study reporting a relation between estrogen or progesterone exposure and thyroid neoplasm. The average size of neoplasms is smaller in women as compared to men (2). Papillary thyroid carcinoma (PTC) has the highest incidence (80%) among the thyroid malignancies, compared to follicular, medullary or anaplastic histotypes (2). PTC is a well-differentiated malignancy and usually presents in an early stage. The prognosis of PTC is very good with standard treatment consisting of total thyroidectomy and subsequent ¹³¹I treatment. Metastasis of PTC usually occurs in the regional lymph nodes. Distant metastases are rare, and usually involve the lung or the bones (4). Adrenal metastasis of a PTC has been described only in three patients (5-7).

We report the case of a 74-year-old woman with adrenal metastasis of a PTC, detected with a total body iodine scan and a PET-CT scan.

Case Report

A 74-year-old woman consulted the outpatient clinic of endocrinology. Her medical history included a PTC with a diameter of 7 cm which was found unexpectedly in the resected specimen after she had undergone a subtotal thyroidectomy because of a retrosternal goiter. After the surgical resection, the thyroid remnant was ablated with a relatively low dose ¹³¹I (925 MBq).

Six months later a lesion in the right side of the neck was noticed. Subsequently she was treated with a therapeutic dose of ¹³¹I (5,550 MBq). The thyroglobulin level (Tg) at that time was 1.2 ng/ml, with a thyroid-stimulating hormone (TSH) level of 20 mU/l. The thyroglobulin antibodies were undetectable. The posttreatment total body scintigram after one week showed only an area of iodine retention in the lower part of the neck at the right side with a corresponding large mass on computed tomography (CT) scan with some intrathoracic growth. She underwent a re-exploration with a completion-thyroidectomy neck dissection with resection of the internal jugular vein and two tracheal rings. The pathological examination showed recurrent PTC with a maximal diameter of 5 cm with 13 loco-regional lymph nodes, without malignancy. However, vaso-invasive growth and growth through the wall of the trachea was noted. She was again

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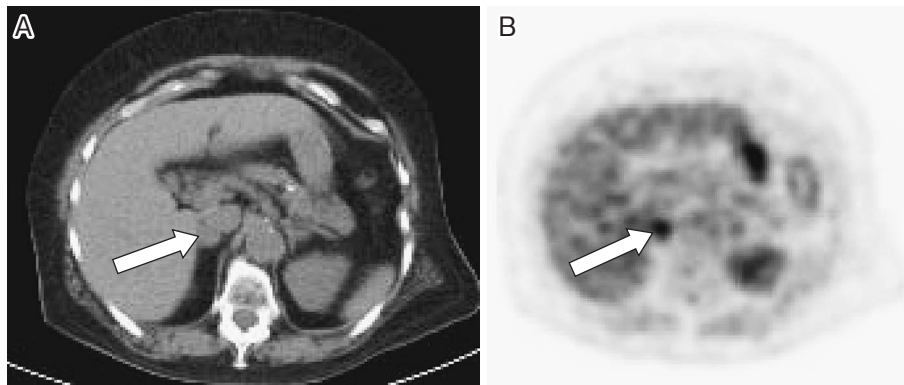


Figure 1. A: CT slice of enlarged right adrenal gland. B: axial slice of F-18 FDG PET scan with intense uptake corresponding to the enlarged right adrenal gland on CT.

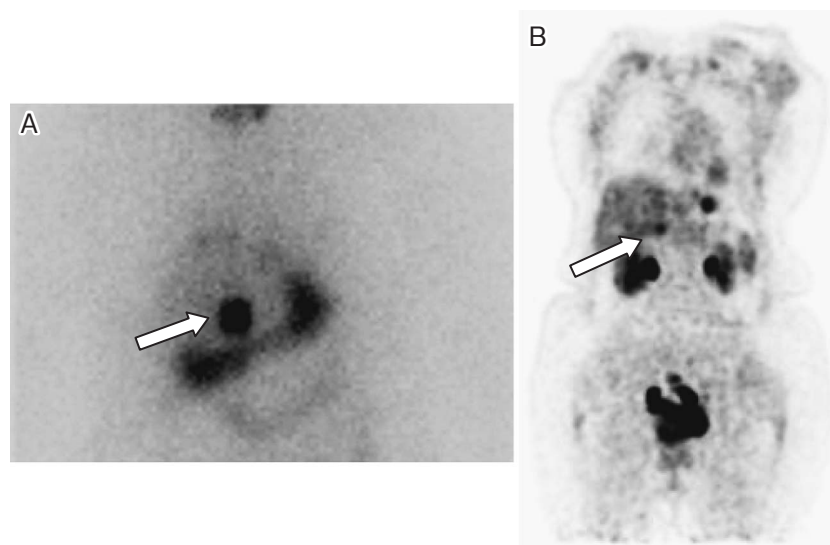


Figure 2. A: anterior view of abdomen of the total body I-131 scintigram. The white arrow points to the focal lesion with pathological iodine uptake. The uptake below and at the medial site is physiologic uptake in the bowel. B: coronal slice of F-18 FDG PET scan. The white arrow points to a focal lesion in the area of the right adrenal gland.

treated with ¹³¹I (5,500 MBq). The total body scintigram after one week showed iodine uptake in the region of the thyroid revealing residual disease and abnormal iodine retention paramedial right in the abdomen, in the area of the right adrenal gland (Fig. 2). The laboratory results showed a TSH of 25 mU/l with an undetectable low Tg level (<1.0 ng/mL). The thyroglobulin antibodies were not detectable.

The abdominal iodine uptake was further investigated with an integrated ¹⁸F-FDG-PET-CT scan. After injection of 187 MBq ¹⁸F-FDG, a total body PET scan was performed with a low-dose CT scan for attenuation correction and anatomical correlation. This revealed a lesion with moderate FDG uptake, paravertebral at the right side in the abdomen (Fig. 1). Other metastatic lesions (e.g. in the lungs) were not detected. After measuring the distance from the abnormal iodine focus to the urine bladder on the iodine scintigram and comparison with the CT-scan images, it appeared that the abdominal iodine uptake was compatible with the localiza-

tion of the (enlarged) adrenal gland at the right side (Fig. 1).

After resection of the tumor in the right adrenal gland, pathological examination confirmed the localization of the papillary thyroid carcinoma (Fig. 3). Additional immunohistochemical studies showed thyroid transcription factor (TTF)-1 and Tg positive cells.

Discussion

Although PTC is the most common thyroid neoplasm, distant metastasis, and adrenal metastasis in particular, are very uncommon, mainly because of the predominantly lymphogenic metastasizing pattern observed in this tumor type. This study reports another patient with an adrenal metastasis of a PTC. The adrenal metastasis could have developed rapidly between the two therapeutic ¹³¹I treatments.

To date, three previous reports have appeared in the literature. The adrenal metastasis in the previously reported pa-

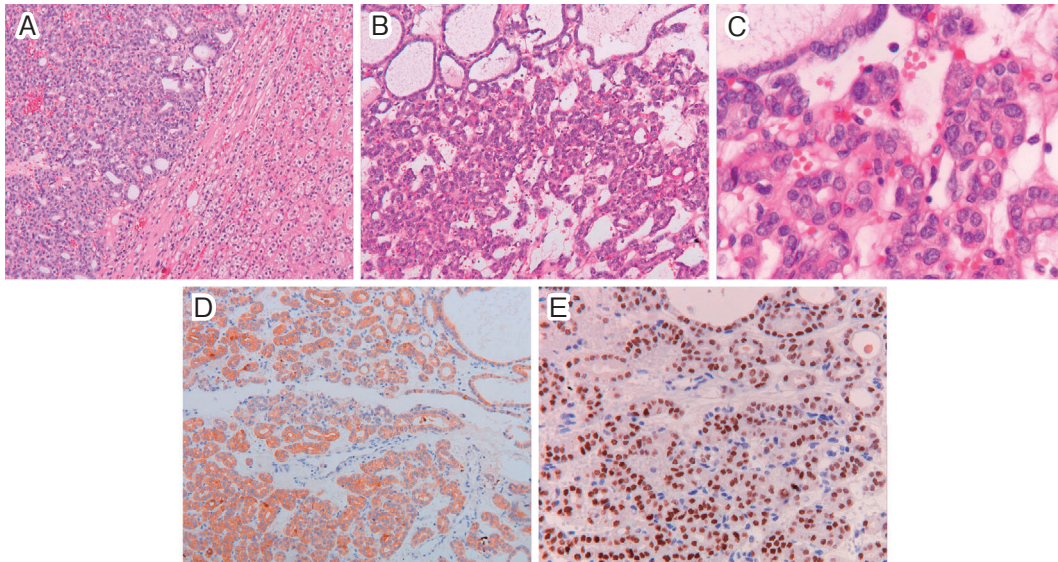


Figure 3. Microscopic images of the adrenal gland with a metastasis of a papillary thyroid carcinoma (PTC). Image A shows adrenal gland tissue (right) and the metastasis mainly consisting of atypical glandular structures (left). At higher magnification (B), the atypical glandular structures become more apparent, with focally micro-follicles and areas with more solid growth. The malignant cells have moderately polymorphic nuclei, many of them with ground glass chromatin, overlapping nuclei and a moderate quantity of eosinophilic cytoplasm (C). There were a few mitoses. With immunohistochemistry, the tumor cells stained with thyroglobulin antibody (D) and thyroid transcription factor (TTF)-1 antibody (E).

tients were not all accompanied with a large localization of the malignancy in the thyroid. A 57-year-old man patient had a primary tumor size of 1.2 cm and after 4 months an adrenal metastasis was detected (5), whereas a 73-year-old woman had a tumor size of 3.5 cm and developed an adrenal metastasis after 9 months (6). A 63-year-old woman had undergone left lobectomy for a PTC and after 8 years she had a right adrenalectomy for a metastasis of PTC (7). Initially, histological examination showed a benign cortical tumor, but later a metastasis of PTC was diagnosed.

It is remarkable that although Black patients were more likely to have larger neoplasms (>4 cm) compared to White patients, Black patients with papillary thyroid carcinoma underwent a total thyroidectomy less often than White patients (85.2%, vs. 87.6%, odds ratio 0.89, p-value 0.03) (8). In addition, compared to White patients, Asian patients are more likely to undergo total thyroidectomy (87.6% vs. 92.2% Odds ratio 1.62, p-value 0.001) (8). In the present case, we performed a ^{18}F -FDG PET-CT scan with low-dose CT to localize the abdominal lesion which was found on the post-therapy iodine scan (9-11). An iodine scan is capable of localizing a lesion with high sensitivity and specificity, however the accuracy for anatomical localization of abnormal findings is often problematic, especially in soft tissues. Due

to the fact that the iodine scan is a functional diagnostic tool which visualizes specific iodine receptors, there are no landmarks of anatomical organs on the scan. Therefore the value of PET-CT is in this case report illustrated with its capability of allocating hypermetabolic abnormalities to specific anatomical regions (9-11). It is well-known that FDG PET is able to detect metastases undetected by ^{131}I post therapy whole-body scanning in patients with elevated Tg levels. In addition, PET is able to localize other malignancies, other than thyroid. Moreover, one could evaluate thyroid dedifferentiated metastasis which shows high glucose metabolism but does not show iodine uptake and is subsequently not seen on a ^{131}I scan. Alternating uptake of FDG and ^{131}I was found in about 90% of the thyroid cancer patients (12). Hence, the present patient belongs to the minority of thyroid cancer patients showing a congruent uptake of iodine and FDG.

Conclusion

This is a report of a patient with an adrenal metastasis of a thyroid carcinoma, which was detected on ^{131}I scan, followed by PET-CT scan, and successfully removed.

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