Hypothyroid Hashimoto’s Thyroiditis with Scintigraphic and Color Flow Doppler Sonography Features Mimicking a Hot Nodule

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Abstract

We report a 59-year-old woman who had Hashimoto’s thyroiditis (HT) with hypothyroidism. A solid hypervascularized nodule in the right lobe was detected by color flow doppler sonography (CFDS). Thyroid ¹¹¹Tc pertechnetate scintigraphy revealed a hot area in the right lobe. After three months, thyroid function tests also revealed hypothyroidism and ¹³¹I scintigraphy was similar to the previous scintigraphy. No nodular or hypervascularized lesion in the right lobe could be identified at the sixth month of L-T4 substitution therapy. In conclusion, HT may present as a single hot nodule and hypothyroidism. Imaging findings of HT should be carefully evaluated for the precise diagnosis.

Key words: Hashimoto’s thyroiditis, hypothyroidism, hot nodule, thyroid scintigraphy, color flow doppler sonography

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Introduction

Hashimoto’s thyroiditis (HT) is an autoimmune thyroid disorder which is probably the most common cause of hypothyroidism. The scintigraphic findings of HT are highly variable and can mimic any other thyroid abnormalities including diffuse hyperplasia, nodular goiter and multinodular goiter (1, 2). Although a homogenous pattern is seen at the early stage of the disease, advanced HT shows inhomogeneous patterns which are composed of cold and hot areas (3). Ultrasonography (US) reveals an enlarged thyroid gland with a diffusely hypoechochogenic pattern in most patients (4) and is helpful for the differential diagnosis of scintigraphic images in HT (3, 5). Thyroid scintigraphy generally shows a non-homogeneous, patchy radionuclide uptake but sometimes patients with unilateral thyroid uptake mimicking a single toxic nodule are observed. HT presenting as a single hot nodule and hypothyroidism is a rare condition; it has been reported in only a few case in the literature (6, 7). Herein, we present a patient who has hypothyroid HT with scintigraphic and color flow doppler sonography (CFDS) features mimicking a hot nodule.

Case Report

A 59-year-old woman who had a history of left thyroid lobectomy 23 years previously was referred to our outpatient service for control of thyroid function in March 2006. The patient did not have any hypothyroid symptoms. We could not obtain the medical history information concerning the thyroid operation and histopathological examination. She also suffers from systemic sclerosis (SSc) and has taken D-penicillamine and hydroxychloroquine for one year.

An old incision scar related to a prior thyroid operation was observed by inspection above the sternal notch. Thyroid palpation revealed a firm right thyroid lobe, while the entire left lobe was non-palpable. Other physical examination find-
Figure 1. Color flow doppler sonography of right thyroid nodule before L-T4 therapy (A) showed increased blood flow in peripheral and intranodular tissue. After L-T4 therapy (B), nodular or hypervascularized lesion in the right lobe was not observed.

Figure 2. Thyroid scans of patient using 99m-Tc pertechnetate (A) and 131-I (B) showed a hot nodule in the right lobe.

ings included vitiligo and the manifestations of skin involvement in SSC. Thyroid function tests showed hypothyroidism with high anti-thyroid autoantibody titers (Table 1).

Thyroid ultrasonography (US) was performed using an Sonoline Ellegra scanner (Siemens, Issaquah, WA) equipped with a 7.5 MHz multifrequency linear-array transducer. A solid hypoechoic nodule of approximately 2×1.5 cm diameters, not well demarcated from the surrounding thyroid tissue was detected in the right lobe. The nodule showed peripheral and intranodular hypervascularization on CFDS (Fig. 1A). The remaining thyroid tissue in the right lobe was markedly hypoechoic and hypovascularized. The volume of the right lobe was estimated at 4.2 mL. The left thyroid lobe was not identified. Another isoechoic solid nodule of 12×7 mm diameters was detected in the isthmus and showed peripheral vascularization on CFDS.

Thyroid scintigraphy was performed with $^{99m}$Tc pertechnetate. Thyroid scintigraphy revealed a hot area (HA) in the lower pole of the right thyroid lobe, corresponding to the nodule in same localization detected by US and low uptake of the left residual thyroid tissue (Fig. 2A). US guided fine needle aspiration cytology (FNAC) of the right nodule showed follicular cells and colloid. Thyroid function tests which were repeated after three months were consistent with hypothyroidism and anti-thyroid autoantibody titers were high (Table 1). At the same time thyroid scintigraphy was performed with $^{131}$I. As concordant with $^{99m}$Tc thyroid scintigraphy, $^{131}$I scintigraphy showed a hot area in the right lobe (Fig. 2B).

After clinical and laboratory evaluation the case was accepted as hypothyroid HT mimicking scintigraphic (either with $^{99m}$Tc or with $^{131}$I) and CFDS features of a hot nodule. L-T4 substitution therapy was started at a dose 100 μg/day to normalize serum TSH. The volume of the right lobe had diminished to 2.6 mL on the control US at the sixth month of therapy. We could not identify any nodular or hypervascularized lesion in the right lobe (Fig. 1B). There was no difference in the diameter of the second nodule which was localized in the isthmus.

Discussion

We report a case of hypothyroid HT mimicking scintigraphic (either with $^{99m}$Tc or with $^{131}$I) and CFDS features of
Table 1. Thyroid Function Tests and Thyroid Autoantibodies of the Patient

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<tr>
<td>FT3 (pg/mL)</td>
<td>2.3</td>
<td>2.03</td>
<td>1.8-4.6</td>
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<tr>
<td>FT4 (ng/dL)</td>
<td>0.5</td>
<td>0.37</td>
<td>0.9-1.7</td>
</tr>
<tr>
<td>TSH (µIU/mL)</td>
<td>10.3</td>
<td>35.1</td>
<td>0.2-4.2</td>
</tr>
<tr>
<td>Anti-TPO (IU/mL)</td>
<td>&gt;1000</td>
<td>&gt;1000</td>
<td>0-35</td>
</tr>
<tr>
<td>Anti-TG (IU/mL)</td>
<td>&gt;3000</td>
<td>&gt;3000</td>
<td>0-115</td>
</tr>
</tbody>
</table>

Anti-TPO: anti-thyroid peroxidase; Anti-TG: anti-thyroglobulin; TSH: thyroid-stimulating hormone

a hot nodule. Scintigraphic hot areas are observed not only in adenoma or adenomatous goiter, but also in various other thyroid diseases. Localized functioning thyroid tissue freed from autoimmune destruction and inflammation in patients with HT may show the same pattern on scintigraphy. CFDS is helpful clinically for the differential diagnosis. Yarman and colleagues (2) have compared the scintigraphic findings with US in 48 patients with HT. The differences in nodularity between thyroid scanning (74.9%) and sonography (60.4%) have been attributed to the pseudonodularity in HT. Iwata and colleagues (3) have analyzed HAs on thyroid scintigraphy with clinical and comparative ultrasonographic findings. In this study, the sonographic findings have been classified into three categories: Category 1: US reveals the identification of a nodule or a well-demarcated thyroid tissue corresponding to scintigraphic HA, Category 2: US reveals the presence of an ill-defined area with different echogenicity, Category 3: US reveals the lack of corresponding lesions. A total of the patients with HT and scintigraphic HA were designated as categories 2 and 3. The present patient had a clear scintigraphic image of a HA and a nodule with increased vascularization by CFDS in the right thyroid lobe corresponding to this image.

Erdogan and colleagues (8) have evaluated the value of CFDS for the etiological diagnosis of hyperthyroidism. They have identified higher perinodular and intranodular signals in toxic adenomas. More prominent vascular patterns have been observed in Graves’ disease patients compared to HT patients. But increased thyroid vascularization has been detected in hypothyroid goitrous HT (9, 10). It has been attributed to thyroid stimulation by either TSH-receptor antibody or TSH. A significant correlation between serum vascular endothelial growth factor (VEGF), an endothelial cell-specific angiogenic factor, and TSH levels in these patients has been reported. It has been reported that after L-T4 therapy the diminishing in intrathyroidal vascular area and thyroid volume accompanied the decreasing serum VEGF levels (9). Similarly, the thyroid volume was diminished in the present case and the hypervascular nodular lesion in the right lobe disappeared as a result of suppression of TSH after L-T4 therapy.

To our knowledge the case reported by Boi and colleagues (6) is the only case with hypothyroid HT mimicking both scintigraphic and CFDS features of an autonomous functioning nodule. These features of the nodule have been shown during subclinical hyperthyroidism as a result of L-T4 therapy. L-T4 therapy was temporary suspended and the patient was re-evaluated 2 months later. Even though the L-T4 therapy was interrupted, the same features have been observed in the nodule. This condition could not be explained by TSH stimulation. In the present case, the hypervascular lesion detected by CFDS disappeared and the volume of the right lobe was diminished 1.6 mL (~39% reduction in first calculated volume) after L-T4 therapy. This observation may suggest that the lesion presenting as a hot nodule is actually localized hyperplasia of the less diseased area secondary to stimulation by TSH. Similarly, Mousavi and colleagues have reported six HT patients presenting a single hot nodule and hypothyroidism (7). The nodules were evaluated by physical examination and scintigraphy not US. Four patients have been followed up for at least 6 months on adequate thyroid hormone replacement. The thyroid nodules have become diminished in size to between 1 and 3 cm diameter in three cases (up to 60% reduction in calculated volume) but showed no change in the fourth case. US is of critical importance in the differential diagnosis of thyroid nodules. If a patient is examined by CFDS, the ultrasonographic features of these scintigraphic hot areas can be readily determined.

In conclusion, although rare, HT may present as a single hot nodule and hypothyroidism. Imaging findings of patients with HT should be carefully evaluated to obtain the precise diagnosis.

References


