Turkish Journal of Endocrinology and Metabolism, (1999) 3 : 109-112 **ORIGINAL ARTICLE**

The Diagnostic Va lue of Ultrasound in the Detection of Hashimoto's Thyroiditis: Comparison with Serum Antibody Levels and Cytology

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Hashimoto's thyroiditis (HT) is one of the m ost common causes of goiter and hypothyroidism. Diffuse low echogenicity has been reported in autoimmune thyroid diseases. In this prospective study we aimed to compare diagnostic value of sonography with serum thyroid autoantibody levels in biopsy proven HT. Sixty-one patients, aged 20-87 years, that had suspicious sonographic findings for HT were in cluded in to the study. Serum Tg-Ab and TPO-Ab, thyroid function tests, erythrocy te sedimentation rate, WBC count and thyroid scintigraphy were carried out and fine needle aspiration biopsies (FNAB) from each lobe were performed on all patients.

According to FNAB results 53 out of 61 patients were diagnosed as HT. Of all FNAB positive patients, Tg-Ab and TPO-Ab were found false negative in 24 (45%) and 13 (24%) patients, respectively. Among FNAB positive patients, only Tg-Ab was positive in 3 and only TPO-Ab was positive in 13 patients. Both Tg-Ab and TPO-Ab were found to be false negative in 10 patients with HT. US was the only positive test suggesting HT in these patients.

In conclusion, positive sonographic findings are highly suggestive of HT even in patients that have normal thyroid autoantibody levels. FNAB should be performe d for definite diagnosis in these patients.

KEY WORDS Hashimoto's thyroiditis, ultrasonography, thyroid autoantibodies

Introduction

Hashimoto's thyroiditis (HT) is one of the most common causes of goiter and hypothyroidism (1). The pathologic findings of HT may vary from a colloid goiter with foci of lymphocytes interspersed among thyroid follicles to a diffuse lymphocytic infiltration and fibrosis that alters the normal follicular structure of the thyroid parenchyma. Although the degree of thyroid lymphocytic infiltration is correlated to some extent with the levels of circulating thyroid autoantibodies there is no clinical or laboratory criterion beside histology to quantify the degree of thyroid involvement by the autoimmune process and, therefore, to distinguish focal from diffuse lymphocytic thyroiditis (2).

Thyroglobulin antibodies (Tg-Ab) are found in over 75% of patients with autoimmune thyroiditis compared to 10-30% of normal subjects. On the other hand human TPO antibodies (TPO-Ab) are found in up to 20% of normal subjects and over 90% of patients with autoimune thyroiditis (3).

Although ultrasonography (US) is widely used for the evaluation of thyroid nodules, its use in diffuse thyroid diseases still remains limited. An abnormal ultrasound pattern of the thyroid, characterized by

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diffuse low echogenicity has been reported in autoimmune thyroid diseases, and its potential value in the diagnosis of HT has been recently emphasized (2, 4-10). However, there are few studies comparing the diagnostic value of US and serum thyroid autoantibodies in HT.

In this prospective study we aimed to compare the diagnostic value of US with serum thyroid autoantibody levels in biopsy proven HT and to determine the sonographic patterns in HT.

Materials and Methods

Patients

Sixty-one patients (5 men, 56 women), aged 20-87 (mean 39) years, that had suspicious sonographic findings for HT in routine US examination were included in the study. All patients had undergone detailed clinical examination. Serum Tg-Ab and TPO-Ab tests, thyroid function tests, erythrocyte sedimentation rate (ESR), WBC count and thyroid scintigraphy with Tc-99m pertechnetate were carried out and fine needle aspiration biopsies (FNAB) from each lobe were performed on all patients.

US and Thyroid Scintig raphy

All scans were performed on a General Electric RT3600 scanner using a 7.5 MHz linear array transducer and a direct contact technique by an experienced sonographer. With the patient supine and the neck moderately extended, transverse and longitudinal images of both thyroid lobes were obtained and echotexture was recorded. The overall gain was adjusted to produce a relatively echo-free appearance of the lumen of the internal jugular vein and neck strap muscles. Under these conditions, a healthy thyroid gland has a medium gray scale homogenous echo pattern, and the level of echogenicity is higher than that of the surrounding muscles (Fig.1). Thyroid volume was calculated as the sum of the products of maximal thickness, width, length and a corrective factor, 0.479, for each lobe (7).

Presence of diffuse hypoechogenicity that is almost equal to or less than that of the adjacent muscles, multiple small irregular echopenic and linear echogenic areas and irregularity of the thyroid borders were accepted as suspicious sonographic findings for HT (Fig.2).

Fig. 1. Transverse (a) and longitudinal (b) sonographic images of a healthy thyroid gland (arrows). Normal thyroid gland has a medium gray scale homogenous echo pattern, and the level of echogenicity is higher than that of surrounding muscles.

Fig. 2. Transverse (a) and longitudinal (b) sonographic appearance of Hashimoto's thyroiditis. Presence of diffuse hypoechogenicity that is almost equal to or less than the adjacent muscles, multiple small irregular echopenic and linear echogenic areas (arrows) and irregularity of the thyroid borders are suspicious sonographic findings for HT.

Thyroid scintigraphies were performed 20 minutes after İV injection of 5 mCi Tc-99m pertechnetate using a gamma camera (GE 400 ACT/Starcam, Milwaukee, WI) equipped with a pinhole collimator. Distribution of activity in the gland was recorded.

Thyroid Function Tests and Thyroid Autoantibodies

Thyroid function tests were used to determine blood concentrations of thyroid hormones. Free T_3

and Free T_4 were measured by radioimmunoassay (RIA) and TSH was measured by immunoradiometric assay (IRMA). Depending on these results patients were considered euthyroid, hyperthyroid, and hypothyroid.

Immunologic studies included serum assays of Tg-Ab and TPO-Ab. Both were measured by RIA and titers of > 100 μIU/ml were regarded as significant.

FNAB

After a brief explanation of the procedure and request not to swallow or speak during procedure, the patient was put in a supine position with the neck extended. The FNAB was performed using a 20-gauge needle attached to a 10-ml disposable syringe. The aspirates were fixed in alcohol and stained with Papanicolau stain. FNABs were repeated if necessary. HT was characterized by Hürtle-cell changes and a significant lymphoid population consisting of mature and transformed lymphocytes.

Results

ESR and WBC counts were normal in all patients. These results excluded the existence of subacute thyroiditis. Thyroid scintigraphy did not give any valuable information regarding HT. Distribution of radioactivity in the thyroid gland was normal in patients with HT, except in those who had nodules and HT.

According to FNAB results 53 out of 61 patients were diagnosed as HT. Of all FNAB positive patients, Tg-Ab and TPO-Ab were found false negative in 24 (45%) and 13 (25%) patients, respectively. Among FNAB positive patients, only Tg-Ab was positive in 3 and only TPO-Ab was positive in 13 patients. Both Tg-Ab and TPO-Ab were found to be false negative in 10 patients with HT. US was the only positive test suggesting HT in these patients. On the other hand, among FNAB negative 8 patients Tg-Ab and TPO-Ab were false positive in 3 and 5 patients, respectively. Three of the FNAB negative patients were diagnosed as having Graves' disease. FNAB showed normal cytologic findings in 5 patients. Mean volume of the thyroid gland in Graves' disease was significantly bigger than in those with HT (44 cc versus 23,24 cc).

Seven patients with HT were hypothyroid and 2 patient with HT were hyperthyroid at the time of diagnosis. Cumulative results of FNAB positive and negative patients are given in Table 1. Positive predictive values of US, Tg-Ab and TPO-Ab were 86%, 90% and 86%, respectively.

Discussion

The diagnosis of HT includes a spectrum of very different clinical entities. The majority of patients have goiter with normal thyroid function and circulating autoantibodies (11). Although most of the patients with HT have circulating thyroid autoantibodies, it has been reported that Tg-Ab and TPO-Ab could be positive in 10-30% and 20% of normal subjects, respectively (3). Moreover, thyroid function is normal in the majority of patients with HT, and only a minority have subclinic or clinic hypothyroidism when first seen (12). So, it could be assumed that some of the patients with HT might be missed during clinical

Table 1. Cumulative results of 61 patients that have suspicious sonographic findings for Hashimoto's thyroiditis.

		FNAB (+) 53 pts	FNAB (-) 8 pts
Tg-Ab	Pos. (100 IU/ml	29 (55%)	3 (37%)
	Neg. (100 IU/ml	24 (45%)	5 (63%)
TPO-Ab	Pos. (100 IU/ml	40 (75%)	5 (62%)
	Neg. (100 IU/ml	13 (25%)	3 (38%)
Functional Status	Hypothyroid	7	-
	Euthyroid	44	5
	Hyperthyroid	2	3
Sex	Female	47	9
	Male	5	-
Mean Volume (cc)		21.49	32.81
Nodules	Positive	12	4

Both Tg-Ab and TPO-Ab were false negative in 10 patients with HT. US was the only positive test suggesting HT in these patients.

examination even when routine laboratory tests are done. With increasing use of the fine needle in the diagnosis of thyroid lesions aspiration cytology is becoming an excellent method for studying the various types of inflammatory and autoimmune diseases. FNAB is the diagnostic method of choice for HT since these are nonsurgical goiters (13).

Previous studies have reported an abnormal thyroid echo pattern characterized by a diffuse low thyroid echogenicity in some patients with HT (2, 4, 5, 7, 13). However, thyroid hypoechogenicity is not specific for HT and may be observed in patients with Graves' disease or subacute thyroiditis (14, 15). Subacute thyroiditis generally does not present a diagnostic problem with existence of pain and high ESR and WBC count. But, it might be difficult to differentiate Graves' disease from HT with serum thyroid autoantibodies and US findings. According to our experience beside diffuse hypoechogenicity, higher thyroid volume and dominance of irregular cystic areas could be useful sonographic clues for Graves' disease.

US is widely used for the evaluation of thyroid pathologies mostly thyroid nodules. It is not un common to encounter diffuse thyroid echo abnormalities during routine sonographic examinations. Although a limited number of studies show that US could give useful hints for HT, the importance of these findings is not well defined.

According to our results diffuse thyroid hypoechogenicity is highly suggestive of HT. Other sonographic findings for HT were multiple small irregular echopenic and linear echogenic areas and irregularity of the thyroid borders. In our series, US was the only positive test in 10 patients. Although positive predictive values of US, Tg-Ab and TPO-Ab were close to each other; 24 patients were missed with Tg-Ab, 13 patients missed with TPO-Ab and 10 patients were missed with both tests.

In conclusion, US is an easy and noninvasive way of evaluating HT. Positive sonographic findings are highly suggestive of HT even in the absence of thyroid autoantibodies. FNAB should be performed for definite diagnosis if thyroid autoantibodies do not support US findings.

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