

ULTRASOUND FINDINGS IN THYROIDITIS*

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Abstract **OBJECTIVE:** The aim of this study was to evaluate sonographic features of thyroid gland in patients with thyroiditis. **MATERIALS AND METHODS:** During a nine-month period, 38 patients previously diagnosed with thyroiditis by the Ultrasound Unit of "Instituto de Radiologia da Faculdade de Medicina da Universidade de São Paulo", São Paulo, SP, Brazil, were studied. Thirteen-six of these patients were women in the age range between 17 and 78 years. The following variables were observed and studied: thyroid volume, echogenicity, echotexture, and the presence of level VI chain lymph nodes (pre-tracheal, the preferential site of thyroid drainage), besides the gland dimensions. **RESULTS:** Thirteen patients had goiter; 37 of 38 thyroid glands presented heterogeneous echotexture and diffuse hypoechogenicity. Thyroiditis was diagnosed by laboratory tests in all patients. Level VI chain (pre-tracheal) lymph nodes were observed in 28 cases, all of them with reactional features. Of these cases, ten patients were submitted to fine needle aspiration biopsy, and the cytological result indicated inflammatory reaction. No case of nodule-simulating focal thyroiditis was found. **CONCLUSION:** The thyroid gland sonographic hypoechogenicity and heterogeneity, in association with the presence of cervical chain lymph nodes, constitute findings of great importance in the diagnosis of thyroiditis when correlated with clinical and laboratory tests findings.

Keywords: Ultrasound; Thyroid; Thyroiditis.

Resumo *Achados ultra-sonográficos na tireoidite.*

OBJETIVO: Avaliar os aspectos ultra-sonográficos da glândula tireóide em pacientes portadores de tireoidites. **MATERIAIS E MÉTODOS:** Num período de nove meses, foram estudados 38 pacientes atendidos no Serviço de Ultra-sonografia do Instituto de Radiologia do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, com diagnóstico prévio de tireoidite. Trinta e seis deles eram do sexo feminino, cujas idades variaram entre 17 e 78 anos. As variáveis observadas e estudadas foram: o volume glandular, a ecogenicidade e a ecotextura, e a presença de linfonodos na cadeia VI cervical (pré-traqueal, o sítio de drenagem linfática preferencial da tireóide) e suas dimensões. **RESULTADOS:** Treze pacientes apresentavam bócio. A análise ao ultra-som mostrou que 37 das 38 glândulas apresentavam ecotextura heterogênea com hipocogenicidade difusa. Todos os pacientes apresentavam alterações nos exames laboratoriais compatíveis com tireoidites. Foram encontrados linfonodos na cadeia cervical VI (pré-traqueal) em 28 pacientes, todos de aspecto reacional. Destes, dez foram submetidos a punção aspirativa por agulha fina e o resultado citológico foi de reação inflamatória. Não foram encontrados casos de tireoidites focais que pudessem simular nódulos. **CONCLUSÃO:** Podemos inferir que para auxiliar no diagnóstico das tireoidites os achados ultra-sonográficos de heterogeneidade e hipocogenicidade glandular, associados aos linfonodos na cadeia cervical VI, são de grande importância quando correlacionados aos exames clínicos e laboratoriais.

Unitermos: Ultra-som; Tireóide; Tireoidite.

* Study developed in the Ultrasound Unit of Instituto de Radiologia do Hospital das Clínicas da Universidade de São Paulo (InRad/HC-FMUSP), São Paulo, SP, Brazil.

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INTRODUCTION

Thyroiditis is a generic term including an array of clinical entities affecting the thyroid gland.

The thyroiditis may present infectious, autoimmune, traumatic, post-radiotherapy, drugs use, and other etiopathogenies. On the grounds of etiopathogeny and clinical findings, eight diseases present with thyroiditis picture: 1) Hashimoto thyroiditis; subacute lymphocytic thyroiditis; 3) subacute granulomatous thyroiditis (De Quervain's disease); 4) postpartum thyroiditis; 5) infectious thyroiditis 6) toxic thyroiditis; 7) actinic thyroiditis; 8) Riedel's thyroiditis.

Subacute and chronic thyroiditis refer to inflammation of the thyroid gland parenchyma where serum thyroglobulin, T3 and T4 levels increase. For this reason, during the initial phase of the disease, the thyroiditis progresses with thyrotoxicosis. After the first weeks, the damages to follicular cells inhibit the hormonal synthesis, resulting in hypothyroidism. In this phase, subacute thyroiditis is a self-limited condition and the gland tissue regenerates. On the other hand in the chronic, autoimmune thyroiditis (Hashimoto) this phase is continuous and progresses to hypothyroidism.

The objective of the present study was to evaluate sonographic features of thyroid gland in patients with thyroiditis.

MATERIALS AND METHODS

During a nine-month period, 38 patients previously diagnosed with thyroiditis by the Ultrasound Unit of Instituto de Radiologia do Hospital das Clínicas da Universidade de São Paulo, São Paulo, SP, Brazil, were studied. Of these patients, 36 were female, with ages ranging between 17 and 78 years (mean age 47.5 years).

The following variables were observed and studied: thyroid volume, echogenicity, echotexture, and the presence of level VI chain lymph nodes (pre-tracheal, the preferential site of thyroid drainage), besides the gland dimensions.

RESULTS

In our casuistic, the greatest majority of patients (36; 94.7%) were female. Thirteen patients (34.2%) presented with goiter (glandular volume > 14.4 cm³). Ultrasound analysis showed heterogeneous echotexture with diffuse hypoechogenicity in 37 (97.3%) of the 38 thyroid glands (Table 1).

All the patients presented alterations compatible with thyroiditis on laboratory tests.

Causal factor or factors could not be determined because of the absence of previous studies performed in our Service. Also, it is important to note that ultrasound findings in thyroiditis, especially in the focal ones, may overlap with those seen in other diseases.

Cervical chain lymph nodes were found at level VI (pre-tracheal) in 28 patients (73.6%), all of them presenting reactionary features (ovoid, with hyperechogenic central hilum). Of these 28 cases, ten patients were submitted to fine needle aspiration biopsy, and the cytological result indicated inflammatory reaction. No case of nodule-simulating focal thyroiditis was found.

DISCUSSION

The diagnosis of thyroiditis is not always easy and immediate, considering that in the initial phases of the disease specific laboratory tests alterations are not detectable. With the progress of imaging methods, some features such as thyroid gland size, shape and echogenicity can be earlier

Table 1 Contingency table.

Patient	Age (years)	Glandular volume (cc)	Echogenicity	Echotexture	Lymph node level	Lymph node dimension (cm)
1	30	14.0	Hypoechogenic	Heterogeneous	Level VI	5 × 5 × 3
2	36	17.3	Hypoechogenic	Heterogeneous	Level VI	3 × 3 × 4
3	50	13.9	Hypoechogenic	Heterogeneous	Level VI	14 × 6 × 4
4	17	72.4	Hypoechogenic	Heterogeneous	Level VI	7 × 6 × 4
5	32	20.9	Hypoechogenic	Heterogeneous	Level VI	9 × 5 × 4
6	37	23.0	Hypoechogenic	Heterogeneous	Level VI	11 × 9 × 4
7	32	9.1	Hypoechogenic	Heterogeneous	Level VI	7 × 5 × 5
8	40	14.4	Hypoechogenic	Heterogeneous		
9	21	13.0	Hypoechogenic	Heterogeneous	Level VI	4 × 4 × 3
10	23	5.9	Hypoechogenic	Heterogeneous	Level VI	8 × 3 × 2
11	20	7.1	Hypoechogenic	Heterogeneous		
12	78	11.8	Hypoechogenic	Heterogeneous		
13	47	9.8	Hypoechogenic	Heterogeneous		
14	70	6.6	Hypoechogenic	Heterogeneous		
15	27	6.1	Hypoechogenic	Heterogeneous	Level VI	7 × 7 × 2
16	57	7.5	Hypoechogenic	Heterogeneous		
17	27	11.0	Hypoechogenic	Heterogeneous	Level VI	5 × 5 × 5
18	26	16.7	Hypoechogenic	Heterogeneous		
19	31	7.7	Hypoechogenic	Heterogeneous	Level VI	18 × 9 × 5
20	40	28.8	Hypoechogenic	Heterogeneous	Level VI	4 × 3 × 2
21	19	10.0	Hypoechogenic	Heterogeneous	Level VI	8 × 7 × 3
22	44	10.7	Hypoechogenic	Heterogeneous	Level VI	10 × 5 × 3
23	44	7.9	Hypoechogenic	Homogeneous		
24	48	5.1	Hypoechogenic	Heterogeneous		
25	27	16.7	Hypoechogenic	Heterogeneous	Level VI	7 × 7 × 3
26	26	10.7	Hypoechogenic	Heterogeneous		
27	46	27.5	Hypoechogenic	Heterogeneous	Level VI	7 × 5 × 3
28	46	19.6	Hypoechogenic	Heterogeneous	Level VI	11 × 6 × 5
29	54	12.0	Hypoechogenic	Heterogeneous	Level VI	5 × 4 × 2
30	28	13.2	Hypoechogenic	Heterogeneous		
31	39	4.7	Hypoechogenic	Heterogeneous	Level VI	6 × 4 × 3
32	37	15.5	Hypoechogenic	Heterogeneous	Level VI	8 × 5 × 3
33	28	18.4	Hypoechogenic	Heterogeneous		
34	28	16.3	Hypoechogenic	Heterogeneous	Level VI	12 × 5 × 4
35	23	8.9	Hypoechogenic	Heterogeneous		
36	54	11.2	Hypoechogenic	Heterogeneous	Level VI	9,6 × 6,9 × 4
37	32	11.7	Echogenic	Heterogeneous	Level VI	11.5 × 7 × 3.8
38	34	16.0	Hypoechogenic	Heterogeneous		

and better evaluated. Consequently, ultrasonography has been useful for evaluating the thyroid gland, especially in dubious cases where morphological and functional characteristics may suggest the actual etiopathogeny of the disease on color Doppler mapping. Some of these characteristics are widely recognized in the worldwide literature.

Hashimoto thyroiditis is the most frequent cause of permanent hypothyroidism

in areas of adequate iodine intake, corresponding to more than 90% of cases. It is part of the spectrum of autoimmune thyroid diseases, typically affecting older women, five to eight times more frequently than men, with an approximate 15% prevalence in this latest group^(1,2). At ultrasound a heterogeneous goiter with micronodules scattered throughout the parenchyma. Progressively, the thyroid gland presents an aspect of chronic hypertrophic thyroiditis with

poorly defined hypoechoic areas permeated by fibrous echogenic layers, giving the gland a pseudolobular appearance (Figure 1). Doppler mapping shows a diffuse hypervascularization pattern similar to Graves' disease (Figure 2). In the later stages of the disease color Doppler shows the thyroid gland reduced in size diffusely heterogeneous due the intense fibrosis and avascularized.

Subacute lymphocytic thyroiditis is also an autoimmune, painless disease characterized by transitory thyrotoxicosis, with lymphocytic infiltrates, similar to the Hashimoto thyroiditis (Figure 3)^(1,2).

Subacute granulomatous thyroiditis (De Quervain's) also manifests with thyrotoxi-

cosis, cervicotalgia, most frequently affecting women at a 3:1–5:1 ratio. It is a reactional, post-viral disease (Cocksackie, adenovirus, mumps, measles, etc.)^(1,3,4). In the initial phase of this disease, ultrasound shows hypoechoic areas with irregular, poorly defined margins, especially in the subcapsular zones (Figure 4). Later, pseudonodules may be observed in the central region of the thyroid gland. In the early phases, vascularization may be reduced (Figure 5).

Postpartum thyroiditis is also an autoimmune process that may occur in the first year after delivery, most frequently between the second and fourth month, affecting up to 7% of women. Recurrence

rates in subsequent gestations are high^(5,6). At ultrasound a diffuse thyroid gland hypoechoogenicity is observed, with even more hypoechoic focal areas (Figure 6).

Other types of thyroiditis occur less frequently, and the infectious ones usually are caused by bacteria⁽⁵⁾; in cases of immunodepressed patients, fungi and tubercle bacillus should be considered as etiological agents. B-mode ultrasound shows poorly defined, hypoechoic foci, probably corresponding to formation of intraparenchymal abscesses. Thyroiditis also can be associated with the use of interferon-2, interleukin and amiodarone⁽⁷⁻⁹⁾.

Riedel's thyroiditis is a rare chronic form of thyroiditis where fibrous tissue replaces the normal thyroid tissue, causing hardening and diffuse destruction of the gland, and tending to extend to the adjacent tissues. This disease may result in dyspnea and dysphagia, and an association exists between Riedel's thyroiditis and retroperitoneal fibrosis, mediastinal fibrosis, pulmonary fibrosis, sclerosing cholangitis, pseudo-tumor of the orbit, etc.^(1,6). At ultrasound, the thyroid gland is shown as a hypoechoic mass infiltrating into the adjacent musculature.

In the greatest majority of cases, the diagnosis is based on clinical findings and laboratory tests results, and ultrasound is an important tool in the morphological evaluation of the thyroid gland, corroborating the diagnosis, and also providing additional information regarding the disease extent

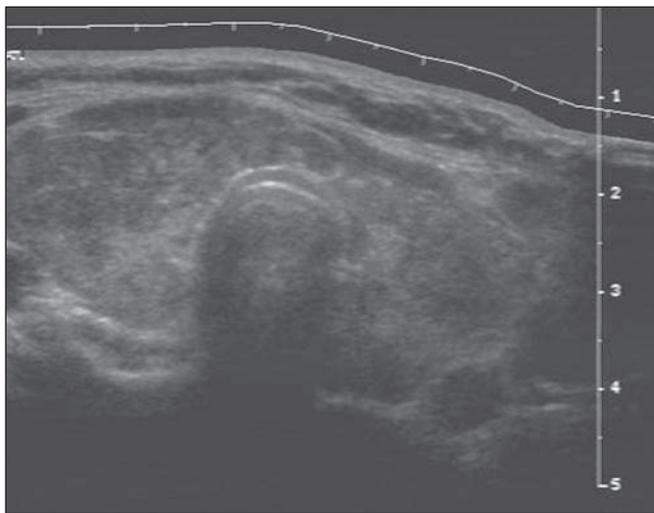


Figure 1. Heterogeneous goiter with parenchymal micronodules, poorly defined hypoechoic areas permeated by fibrous echogenic layers, giving the gland a pseudolobular appearance.

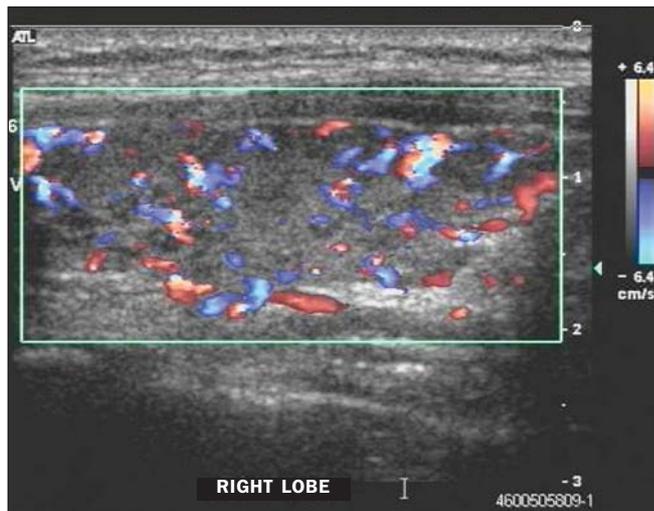


Figure 2. Doppler mapping showing a diffuse hypervascularization pattern.

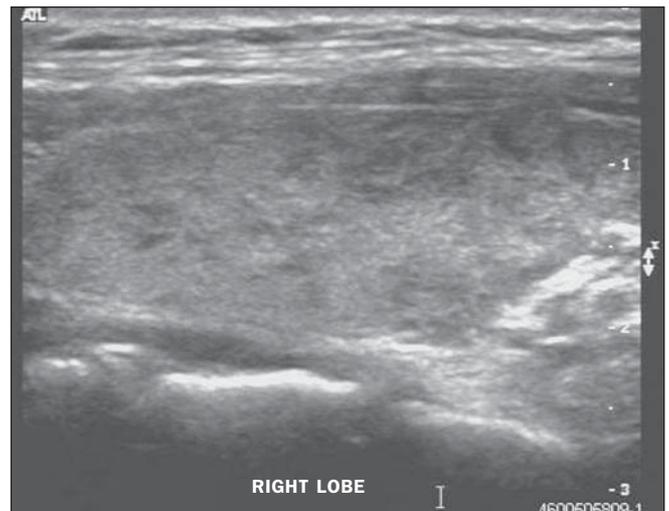


Figure 3. Heterogeneous thyroid gland with poorly defined hypoechoic areas, and slightly lobular margins.

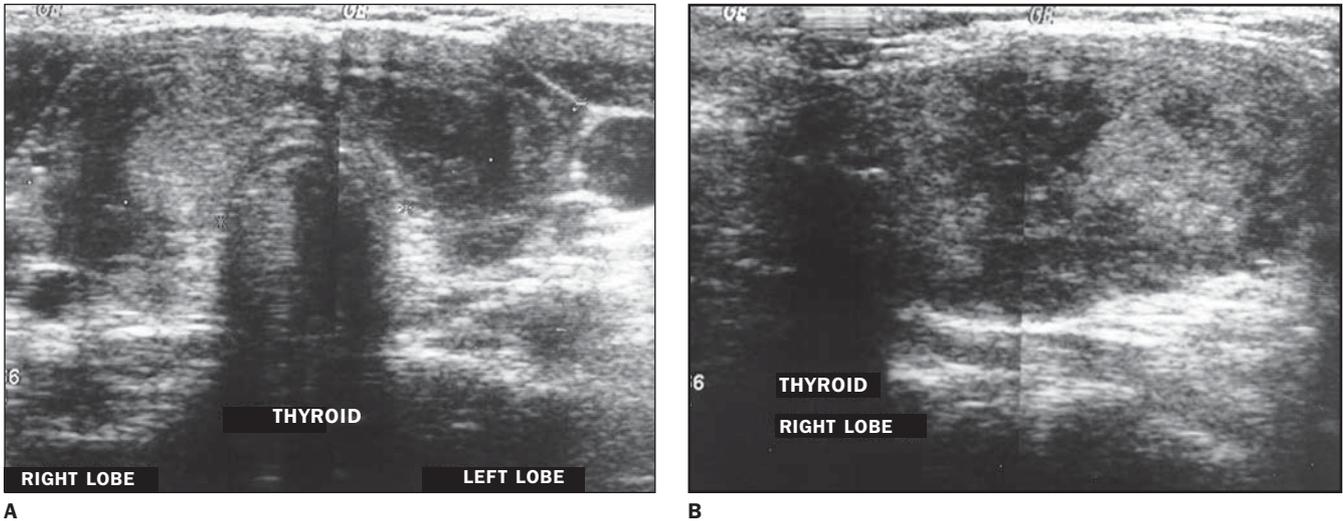


Figure 4. De Quervain's thyroiditis. Hypoechoic areas with poorly defined and irregular contours are observed, especially in subcapsular areas.

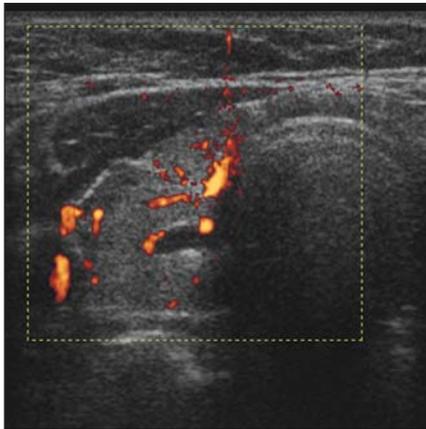


Figure 5. Hypoechoic areas with poorly defined and irregular contours are observed, with pseudonodules in the central region of hypovascularized thyroid gland.

and mainly regarding cervical chain lymph node involvement (level VI, pre-tracheal, the preferential site of thyroid drainage)⁽¹⁰⁾. Although these lymph nodes are not mentioned in current studies, they may be confused with thyroid isthmus nodules. Fine needle aspiration biopsy demonstrated that these lymph nodes were of reactional inflammatory origin (Figure 7).

Our casuistic matches the literature, the majority of our patients being female, with 97.3% of the thyroids evaluated presenting diffusely hypoechoic and heterogeneous at examination (with poorly defined, hypoechoic foci and permeated with echogenic layers), as well as the presence of cervical chain lymph nodes in 73.6% of

cases. However, only 34.2% of the patients presented with goiter in the moment of examination.

It is important to note that patients must be carefully evaluated in order to avoid that the presence of any nodule is missed in the middle of a heterogeneous parenchyma, since 20% of patients with Hashimoto thyroiditis may develop malignant nodules or thyroid lymphomas⁽¹¹⁾. Lymph nodes evaluation, especially by means of B-mode morphological imaging is also relevant, since these lymph nodes may correspond to previously unknown malignant processes⁽¹²⁾. About 10%–15% of Hashimoto thyroiditis course with lymphadenomegaly of questionable nature⁽⁹⁾.



Figure 6. Postpartum thyroiditis. Note the diffuse thyroid gland hypoechoicity permeated by even more hypoechoic areas.



Figure 7. Lymph nodes with reactional appearance (arrows) with loss of echogenic central hilum in the pretracheal chain, confirmed by fine needle aspiration biopsy.

CONCLUSION

One may conclude that ultrasound findings of glandular heterogeneity and hypoechogenicity, associated with cervical chain (level VI) lymph nodes, are extremely useful in the diagnosis of thyroiditis when correlated with laboratory and clinical tests.

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