Objective: Patients with overt hypothyroidism show decreased echogenicity of the thyroid at ultrasonography (US). The aim of the study was to investigate the association between echogenicity of the thyroid/irregular echo pattern, and thyroid function in the general population, i.e. subjects without overt thyroid disease.

Design: A cross-sectional investigation of 4,649 randomly selected adult subjects.

Methods: Blood samples were analysed for serum TSH, thyroid hormones and thyroid autoantibodies. US of the thyroid was performed.

Results: Participants with decreased echogenicity (n=379) had a higher mean serum TSH (1.65 mU/L) compared with subjects with normal echogenicity (1.21 mU/L; P<0.0001). The association was stronger in subjects with markedly decreased echogenicity (4.20 mU/L; P<0.0001). A similar association was seen when the subjects were divided into subgroups according to the level of TSH: more subjects with high levels of TSH had decreased echogenicity (P<0.0001). Likewise, more subjects with high levels of TSH had an irregular echo pattern (P<0.0001). Subjects with decreased echogenicity had a higher risk of having thyroid autoantibodies than subjects without decreased echogenicity (P<0.0001) and this association was stronger when echogenicity was markedly decreased.

Conclusion: The study demonstrated an association between hypoechogenicity at thyroid US and higher levels of serum TSH even in subjects without overt thyroid disease, suggesting decreased echogenicity as an early sign of thyroid dysfunction. Irregular echo pattern, whether accompanied by hypoechogenicity or not, was another possible marker of thyroid failure. This indicates a possible use of thyroid US in detecting early and subclinical thyroid dysfunction.

COMMENT

In clinical practice, one is often confronted with the question of how to define a “preclinical stage” of hypothyroidism. Twenty years ago, the frequent use of the TRH stimulation test was a classical way to assess an exaggerated pituitary response of serum TSH, helping to delineate patients with preclinical hypothyroidism. With the more recent advent of sensitive TSH assays, the TRH stimulation test has been
largely replaced by the finding of slightly raised serum TSH levels (say between 4-6 mU/L) which has progressively led to the concept of subclinical hypothyroidism (i.e. an abnormal TSH with normal free T4). More recently even, the normal serum TSH range has been revisited, leading some authors to propose to narrow further the truly normal serum TSH range, say from 0.40-4.0 to 0.40-2.5 mU/L. When slight serum TSH abnormalities are encountered, the next question is the etiology of preclinical hypothyroidism. Since thyroid autoimmunity is, by far, the most common cause of subtle thyroid dysfunction, the association of an abnormal serum TSH level with positive thyroid antibodies serves to reinforce the clinical suspicion of an early stage of thyroid underfunction. Similarly, ultrasonography of the thyroid gland (US) often reveals irregular echo patterns and hypoechogetic areas in the gland of patients with chronic thyroid autoimmunity. The main interest of the present population study was to investigate a large group of normal subjects, in order to evaluate the frequencies and associations of abnormal US patterns, presence of thyroid autoantibodies, and thyroid (dys)function. When neither hypoechogeticity nor irregular echo patterns were present in the population, only 2.2% of subjects had subclinical hypothyroidism (SCH), defined herein as a serum TSH above 3.6 mU/L. Conversely, irregular echo patterns alone were found in 5% of SCH patients; hypoechogeticity alone in 12% of SCH patients; and the association of both irregular echo and hypoechogetic patterns at US in 27% of patients with SCH. Furthermore, when participants showed both abnormalities at US examination, positive TPO-Ab was present in almost half of the subjects. Present results indicate that routine US examination is a useful complementary tool to laboratory biochemical data (i.e. TSH, free hormones, autoantibodies) in the early evaluation of thyroid status. (Daniel Glinoer, M.D.; Ph.D.)

See Figure below