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# Subclinical Central Hypothyroidism Can Be Diagnosed by Echocardiography

Doin FC, Rosa-Borges M, Martins MR, Moisés VA, Abucham J. Diagnosis of subclinical central hypothyroidism in patients with hypothalamic-pituitary disease by Doppler echocardiography. Eur J Endocrinol 2012;166:631-40. Epub January 20, 2012.

## SUMMARY

### Background

Central hypothyroidism is a condition resulting from reduced secretion of normal TSH or secretion of biologically inactive TSH in patients with lesions in the hypothalamic–pituitary area. The diagnosis is based on low $FT_4$ with low, normal, or even slightly elevated serum TSH with presumably less biologic activity because of altered glycosylation (1). Subclinical primary hypothyroidism is a well-recognized entity diagnosed by elevated serum TSH with normal $FT_4$ measurements. The authors proposed that there is a diagnostic entity of subclinical central hypothyroidism even though the $FT_4$ is in the normal range. They based their diagnosis of subclinical central hypothyroidism on echocardiographic parameters. This concept is consistent with numerous studies that have shown cardiac abnormalities in patients with subclinical primary hypothyroidism that is reversed by treatment with levothyroxine (2).

### Methods

The authors studied 35 patients with hypothalamic–pituitary disease; they excluded patients with hypertension or coexisting primary cardiac disease as well as acromegaly and Cushing's disease because of the cardiac effects of these disorders. Ten of the cases of hypothalamic–pituitary disease were classified as overt central hypothyroidism because the $FT_4$ was low. These authors also studied 28 controls and 20 patients with overt primary hypothyroidism. The patients and controls had echocardiographic assessment to determine the isovolumic contraction time (ICT) and the ejection time (ET) and calculated the myocardial performance index (MPI).

### Results

Based on statistical evaluation of the echocardiography, the cutoff values for the diagnosis of hypothyroidism were: ICT >53 msec (sensitivity, 83% [95% confidence interval {CI}, 65 to 94]; specificity, 96% [CI, 82 to 100]); ICT/ET ratio >0.18 (sensitivity, 83% [CI, 65 to 94]; specificity, 96% [CI, 82 to 100]); and MPI >0.46 (sensitivity, 90% [CI, 74 to 98]; specificity, 93% [CI, 77 to 99]). The patients with overt central hypothyroidism had alterations in echocardiographic parameters that were similar to those of primary hypothyroidism with prolongation of ICT and increased MPI.

Using echocardiographic assessment, hypothyroidism was diagnosed in 14 of the 25 patients with hypothalamic–pituitary disease who had normal $FT_4$, and these patients were classified as subclinical central hypothyroidism. Patients with the diagnosis of hypothyroidism were treated with levothyroxine to raise the $FT_4$, including not only those with overt primary or central hypothyroidism but also those with subclinical primary and subclinical central hypothyroidism. In those with subclinical central hypothyroidism, the mean $FT_4$ increased from a baseline of 0.96 to 1.38 ng/dl (normal range, 0.7 to 1.54). $T_4$ therapy significantly decreased all diagnostic echocardiographic parameters in both subclinical primary and subclinical central hypothyroidism and corrected 28 of 29 abnormal parameters in subclinical primary hypothyroidism and 21 of 29 abnormal parameters in subclinical central hypothyroidism.

### Conclusions

Echocardiography can be used to make the diagnosis of subclinical central hypothyroidism in patients with hypothalamic–pituitary disease.

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## ANALYSIS AND COMMENTARY

The authors make a convincing claim that echocardiography will diagnose tissue hypothyroidism in patients with subclinical thyroid disease, both primary and central. The parameters generally reverted to normal with levothyroxine treatment, but whether this may have occurred in euthyroid subjects is a moot point. They note that deficiencies in growth hormone and sex steroids were distributed nearly equally between those who did and those who did not have subclinical central hypothyroidism, leading them to conclude that these hormones did not affect the echocardiographic diagnosis. Coexistence of cardiac disease is the main limitation in the use of echocardiography for making the diagnosis of hypothyroidism.

The parameters that were used in the study can easily be calculated when standard echocardiography is performed, and thus this technique can be used for diagnosis of hypothyroidism; but echocardiography is an expensive test for making this diagnosis. Most endocrinologists use the $FT_4$ level and clinical judgment based on experience to make the diagnosis of central hypothyroidism. If there are other pituitary deficiencies and the $FT_4$ is in the low normal range, a trial of levothyroxine is worthwhile, with the goal of raising its level to the midnormal range. In order to avoid precipitating an adrenal crisis, evaluation of the ACTH-adrenal axis and treatment of adrenal insufficiency is mandatory before commencing thyroxine therapy.

**— Jerome M. Hershman, MD**

## References

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