

Woltman's Sign of Hypothyroidism

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Hypothyroidism is a common endocrine disorder encountered in daily practice. It may range from a relatively asymptomatic state to a life-threatening condition (ie, myxedema coma). Various symptoms may be voiced by patients with hypothyroidism, including fatigue, cold intolerance, dyspnea, weight gain, constipation, dry skin, depression, fatigue, and menstrual irregularities.¹ Physical manifestations also are many and include hypertension, bradycardia, sparse lateral eyebrows, thin hair, periorbital and peripheral edema, evidence of pleural effusions, and macroglossia. Neurologic manifestations of hypothyroidism include carpal tunnel syndrome, paresthesias, peripheral neuropathy, confusion, and psychosis (ie, "myxedema madness").^{1,2} Indeed, the symptoms and signs of hypothyroidism are often nonspecific, and it is the combination of historical clues and physical examination findings that often leads to the decision to measure thyroid-stimulating hormone to establish the diagnosis.

An additional clinical sign that is very suggestive of hypothyroidism is delayed reflexes, or Woltman's sign.¹ Woltman's sign, named for the neurologist Henry William Woltman, MD (1889–1964), is classically described as a delay of the relaxation phase of an elicited deep tendon reflex. The pathophysiology of delayed reflex relaxation may relate to decreased muscle levels of myosin ATPase, resulting in slowing of muscle contraction.³ Also, the rate of muscle relaxation depends on the rate of calcium re-accumulation in the endoplasmic reticulum, and this rate is slowed in persons with hypothyroidism.⁴

ELICITATION

Clinically, Woltman's sign is most easily observed at the Achilles tendon, patellar tendon, or biceps tendon, although an astute examiner may elicit the reflex abnormality at other sites. One should keep in mind, however, that the Achilles tendon reflex may not always be reliable because the ankle-jerk reflex may be difficult to assess in elderly patients or in those with diabetes, neurosyphilis, myotonic dystrophy, pernicious anemia, amyloidosis, alcoholic neuropathy, or com-

WOLTMAN'S SIGN

Definition: Delay of the relaxation phase of an elicited deep tendon reflex. Most easily observed at the Achilles, patellar, or biceps tendon.

Elicitation: Briskly tap the tendon with a reflex mallet, finger, or bell of a stethoscope. Palpate as well as observe the resultant reflex to appreciate the presence of a delay.

pression of the S1 nerve root by bone or herniated disc material.⁵

Regardless of the site of examination, the clinician should briskly tap the tendon with a reflex mallet; in a pinch, a finger or the bell of a stethoscope can be used. Observation as well as palpation of the resultant reflex should be used together to appreciate the delayed reflex characteristic of hypothyroidism.

DIAGNOSTIC UTILITY

Prolongation of the ankle jerk has been reported to have approximately 62% to 100% diagnostic utility in patients with symptomatic hypothyroidism.^{5,6} The relaxation half-time in normal persons is approximately 240 to 320 milliseconds, with approximately 75% of patients with hypothyroidism having values that exceed this range.⁷ Reinfrank and colleagues measured reflex relaxation times with a specialized recording device and noted a positive predictive value of 72% for a delayed phase of relaxation indicating hypothyroidism.⁷ The degree of prolongation of the relaxation phase is proportional to the severity of hypothyroidism: the more symptomatic the illness, the longer the relaxation phase.⁸ Conversely, Woltman's sign has little

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Table. Selected Etiologies of a Prolonged Reflex Relaxation Time

Anorexia nervosa
Advanced age
Diabetes mellitus
Drugs: β -adrenergic antagonists, IV dextrose, IV potassium, quinidine, reserpine
Hypothermia
Peripheral arterial disease
Peripheral edema
Pernicious anemia
Pregnancy
Sarcoidosis

IV = intravenous.

Data from Adams et al³ and Klein.⁸

diagnostic utility in patients with subclinical or asymptomatic hypothyroidism.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis for diseases that can slow the relaxation phase of deep tendon reflexes is somewhat broad (**Table**). Depending on other presenting signs and symptoms, therefore, clinicians should con-

sider other disease processes in patients with delayed reflexes and keep in mind that rarely, patients may have more than one contributory mechanism. **HP**

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