



Hypothyroidism

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ABSTRACT: *Hypothyroidism is usually a primary process resulting from failure of the thyroid gland to produce adequate amounts of hormone. It may also be caused by a lack of thyroid hormone secretion secondary to the failure of adequate thyrotropin ie thyroid-stimulating hormone (TSH) secretion from the pituitary gland, or thyrotropin-releasing hormone (TRH) from the hypothalamus (secondary or tertiary hypothyroidism).*

Patients may largely be asymptomatic or may rarely present with coma and multi-system organ failure (myxoedema coma). Cretinism refers to congenital hypothyroidism.

Under normal circumstances, the thyroid releases 100-125 mcg of thyroxine (T4) daily and only small amounts of tri-iodothyronine (T3). The half-life of T4 is approximately 7-10 days. T4, a pro-hormone, is converted to T3, the active form of thyroid hormone, in the peripheral tissues.

AETIOLOGY

- Worldwide, iodine deficiency is the foremost cause of hypothyroidism.
- The most frequent cause of acquired hypothyroidism is auto-immune thyroiditis (Hashimoto's thyroiditis)
- Inflammatory conditions or viral syndromes may be associated with transient hypothyroidism (de Quervain or painful thyroiditis, sub-acute thyroiditis).
- These are often associated with fever, malaise, and a painful and tender gland.
- Up to 10% of postpartum women may develop lymphocytic thyroiditis in the 2-10 months following delivery.
- Drugs such as amiodarone, interferon alpha, thalidomide, and stavudine have also been associated with primary hypothyroidism.
- Use of radioactive iodine for treatment of Graves' disease generally results in permanent hypothyroidism within one year of therapy.
- Previous thyroid injury due to surgery or external irradiation (for head and neck neoplasms, breast cancer, or Hodgkin's disease) may result in hypothyroidism and require monitoring.

- Central hypothyroidism (secondary or tertiary) results when the hypothalamic-pituitary axis is damaged. Various causes should be considered: Pituitary adenoma.
- Tumours impinging on the hypothalamus.
- History of brain irradiation.
- Drugs (eg dopamine, lithium)

APPROACH TO THE PATIENT

ON EXAMINATION

- Hypothermia.
- Weight gain.
- Slowed speech and movements.
- Dry skin.
- Jaundice.
- Pallor.
- Coarse, brittle, straw-like hair.
- Loss of scalp hair, axillary hair, pubic hair, or a combination.
- Dull facial expression.
- Coarse facial features.
- Periorbital puffiness.
- Macroglossia.
- Goitre.
- Hoarseness.
- Decreased systolic blood pressure and increased diastolic blood pressure.
- Bradycardia.
- Pericardial effusion.
- Abdominal distension.
- Non-pitting oedema (myxoedema).
- Pitting oedema of lower extremities.
- Hyporeflexia with delayed relaxation, ataxia, or both.

Additional signs specific to different causes of hypothyroidism, such as diffuse or nodular goitre or



pituitary tumour, can occur. Medical conditions associated with hypothyroidism include anaemia, dilutional hyponatraemia, and hyperlipidaemia.

INVESTIGATIONS

- Third-generation TSH assays are readily available and are generally the most sensitive screening tool for hypothyroidism. In most healthy patients, TSH values are 0.5-1.5 mU/L, but reference ranges vary up to 5 mU/L.
- If TSH levels are above the reference range, directly measure or perform a surrogate assessment of free-hormone levels using additional tests. A free-T4 test is recommended over a total-T4 test or other measurement because it is not affected by thyroid hormone-binding proteins.
- Age guidelines for age related reference ranges for TSH: AGE REFERENCE RANGE
 - CORD BLOOD: 2.0-40.0 µIU/ml
 - 1-6 days: 0.4-15.0 µIU/ml
 - 1 week to 1 year: 0.4-10.0 µIU/ml
 - 1 year and above: 0.4-5.5 µIU/ml
- TEST METHOD: Chemiluminiscence
 - Evaluation of the presence of thyroid auto-antibodies (anti-microsomal or anti-TPO antibodies) and anti-thyroglobulin (anti-Tg) may be helpful in determining the aetiology of hypothyroidism or in predicting future hypothyroidism.
 - Anti-TPO antibody testing may also help to diagnose Hashimoto's thyroiditis as an aetiology of primary failure.
 - In patients with non-thyroid disease who are severely ill, TSH secretion is decreased, T4 levels are decreased and T3 levels are markedly decreased.
 - Ultrasound of the neck and thyroid can be used to detect nodules and infiltrative disease. It has little use in hypothyroidism per se unless a secondary anatomic lesion in the gland is of clinical concern.
 - Radioactive iodine uptake (RAIU) and thyroid scanning: patients with Hashimoto's thyroidi-

tis may have relatively high early uptake (after 4 h) but do not have the usual doubling of uptake at 24 hours, suggestive of an organification defect.

- Fine-needle aspiration biopsy: thyroid nodules are often found incidentally during physical examination, chest radiograph, CT scan, or MRI.
- Thyroid nodules can be found in patients who have hypothyroid, euthyroid or hyperthyroid. Fine-needle aspiration (FNA) biopsy is the procedure of choice to evaluate suspicious nodules.

MANAGEMENT

- The treatment goals for hypothyroidism are:
 - Reversal of clinical progression.
 - Correction of metabolic derangements as evidenced by normal blood levels of
 - TSH and free T4.
- Thyroid hormone is administered to supplement or replace endogenous production. In general, hypothyroidism can be adequately treated with a constant daily dose of LT4. Clinical benefits begin in 3-5 days and level off after 4-6 weeks.
- Thyroxine substitution is always indicated if the TSH concentration is increased and the patient has symptoms. In asymptomatic patients treatment is indicated, if serum TSH is above 10 mU/ml and the patient has anti-thyroid antibodies.
- Many patients have a slightly-increased serum TSH concentration (5 - 10 mU/l) and a serum free-thyroxine concentration at the lower limit of the reference range (subclinical hypothyroidism). At the lower limit of the reference range the result is distorted by the determination methods, leading to higher values.
- Thyroxine substitution can be tried.
- In these patients a therapeutic trial of 50 - 100 µg thyroxine once daily can be performed without any harm.
- Antibody positivity favours a treatment trial.

- If the treatment does not improve the patient's condition it can be discontinued. After discontinuation, transient symptoms of hypothyroidism may occur for up to one month while the thyroid gland gradually restarts functioning.
- A treatment trial for subclinical hypothyroidism is a debated issue and often ends disappointingly: in many cases cholesterol levels and unspecific symptoms are corrected or alleviated only a little.
- In young patients the initial dose is 50 - 100 µg/day. TSH is assessed 6 - 8 weeks from the initiation of therapy.
- In the elderly and in patients with ischaemic heart disease the initial dose is 12.5 - 25 µg/day, and the dose should be increased slowly and carefully, monitoring heart rate. If necessary, beta blockers should be used. Cardiac patients may not be given very high doses of thyroxine.
- The response to treatment is evaluated on the basis of clinical symptoms, serum TSH and free T4. TSH is the most important examination. The patient should not take thyroxine on the morning of the day when free T4 is to be measured. In long-term follow-up it is, however, justified to occasionally examine both TSH and free T4. TSH may be below the reference range, which is acceptable, if free T4 is within the normal range and the patient is well. In some cases, the subjective condition of the patient is more important than laboratory tests as a guideline for dosing.
- After a change in the dose of thyroxine serum,

free T4 and TSH are determined after 8 weeks at the earliest because the concentration of TSH changes slowly.

- When the dose has been established, TSH is determined at intervals of a few years.
- In controversial cases (e.g. in possibly transient hypothyroidism), serum TSH should be determined 6 weeks after discontinuation of treatment. If serum TSH rises above the reference range permanent thyroxine substitution is indicated.
- Remember the possibility of concurrent Addison's disease, if the patient does not improve or has low blood pressure, high potassium, low sodium, tendency to low blood glucose or pigmentation. In Addison's disease, 25% have concurrent.

TREATMENT DURING PREGNANCY

- Thyroxine requirement is increased by 25 - 50 µg.
- Euthyroidism is important to the well-being of the mother and thus also for the foetus, particularly in early pregnancy.
- Certain drugs, particularly iron supplements, disturb the absorption of thyroxine; the drugs must be taken at different times.
- Surgery is indicated for large goitre that compromises tracheo-oesophageal function; surgery is rarely needed in patients with hypothyroidism and is more common in the treatment of hyperthyroidism.

Vitamin D preparation used in the treatment of hypothyroidism.

Have a look.....things you may not know....

- **TYPEWRITER** is the longest word that can be made using the letters on one row of the keyboard.
- **Women blink nearly twice as much as men!**
- **You can't kill yourself by holding your breath.**
- **It is impossible to lick your elbow.**