

# 3-thyroid disorders

**Hypothyroidism.**

**Hyperthyroidism.**

**Subclinical hypothyroidism.**

**Thyroid nodule.**

**Objectives:**

**1-Definition and Etiology.**

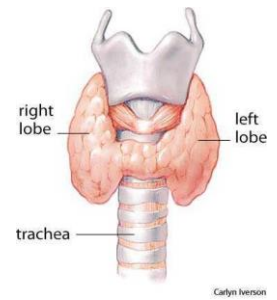
**2-Clinical Features.**

**3-Approach (history, physical examination, investigations, management “treatment and when to refer”).**



## Introduction

The Thyroid is a small gland located in the lower-front part of your neck. It's responsible for helping to regulate many of the body's processes, such as metabolism, energy generation, and mood. The thyroid produces two major hormones: triiodothyronine (T3) and thyroxine (T4).



## Hypothyroidism

### Definition

Hypoactivity of the thyroid gland.

### Etiology

#### Primary causes:

1. Hashimoto's thyroiditis with goiter.
2. "Idiopathic" thyroid atrophy, presumably end-stage
3. autoimmune thyroid disease, following either Hashimoto's thyroiditis or Graves' disease.
3. Neonatal hypothyroidism due to placental transmission of TSH-R blocking antibodies.
4. Radioactive iodine therapy for Graves' disease.
5. Subtotal thyroidectomy for Graves' disease or nodular goiter.
6. Excessive iodine intake or low intake (kelp, radiocontrast dyes)
7. Subacute thyroiditis
8. Iodide deficiency
9. Other goitrogens such as lithium, amiodarone, antithyroid drug therapy Inborn errors of thyroid hormone synthesis.

#### Secondary causes:

- Pituitary adenoma
- pituitary ablative therapy
- pituitary destruction

### Tertiary causes:

- Hypothalamic dysfunction (rare).
- Peripheral resistance of the action of thyroid hormone rare cause, receptors on thyroid are dysfunctional.

## Clinical Features

| Clinical Manifestation of Hypothyroidism |   |
|--|---|
| <b>General</b>                           | Myxedematous Appearance (caused by infiltration of mucopolysaccharides) pericardial/pleural effusion, carpal tunnel syndrome. Weight gain |
| <b>Skin</b>                              | Scaliness of skin, Brittle hair and loss of outer eyebrow   |
| <b>Brain</b>                             | Cognitive dysfunction, Hypothermia, Cold Intolerance, Extreme Somnolence sleepiness, Decrease Appetite                                    |
| <b>GIT</b>                               | Constipation  |
| <b>Renal</b>                             | Oliguria electrolyte abnormality seen is hyponatremia   |
| <b>Heart</b>                             | Bradycardia   |
| <b>Eye</b>                               | Periorbital Edema   |
| <b>Muscles</b>                           | Proximal Myopathy, Fatigue, Delayed Relaxation Reflexes.  |
| <b>Reproductive</b>                      | Male → Loss of libido. Women → Menorrhagia.   |

## Approach

### History:

#### History of presenting illness:

1. Exposure to ionizing radiation
2. Iodide ingestion:
  - Kelp type of seafood
  - Iodide-containing cough preparation
  - IV Iodide-containing contrast media
  - Lithium carbonate (anti-psychotic)
3. Residence in an area of low dietary iodide

#### Family history:

1. Thyroid disease.
2. Immunologic disorders:
  - Diabetes
  - Rheumatoid disease
  - Pernicious anemia
  - Alopecia
  - Vitiligo
  - Myasthenia gravis
  - MEN 2A

## Physical Examination:

Cool rough dry skin, puffy face and hands, hoarse husky voice, and slow reflexes, yellowish skin discoloration.

## Investigations:

- **Elevated serum TSH** is the Initial test.
  - ❖ (If clinical presentation is of hypothyroidism + elevated TSH, it is primary hypothyroidism. No need for T3, T4. if TSH is normal do T3 T4)
- **Low serum T4**
- **Thyroid antibodies**
- **TRH stimulation test** (not done any more).
  - ❖ In primary hypothyroidism TSH is high, in secondary TSH is low or normal
  - ❖ (If TSH is high and normal T3 T4. subclinical hypothyroidism (mild hypothyroidism). Treat in pregnancy, dyslipidemia, elderly, puberty (for growth). If patient is asymptomatic, monitoring is enough).

## Management:

### ❖ **Hypothyroidism:**

Levothyroxine (T4) is Very Safe medication, can be used in pregnancy or lactation, in kids' elderly. repeat thyroid function test after 6 weeks, if TSH is normal this means the dose is right.

### ❖ **Myxedema coma**

In pituitary myxedema,

1. glucocorticoid replacement is essential
2. IV levothyroxine: loading 300-400 ug, daily maintenance 50 ug
3. non active rewarming (Blanket).

(Active rewarming of the body is contraindicated. Causes vasodilation which causes blood pressure to drop even more.)

### **Toxic effects of levothyroxine therapy:**

1. Osteopenia and osteoporosis, Cardiac symptoms, no allergy has been reported to pure levothyroxine.
2. Symptoms occur when dose is wrong (**high**)

## Subclinical Hypothyroidism

### Definition

Is a disease that is characterized by the high level of TSH with free thyroxin concentration within the lower normal range.

### Etiology

Same as hypothyroidism causes.

### Clinical Features

Same as hypothyroidism.

### Approach

#### Investigations:

- **Elevated serum TSH** is the Initial test.
  - ❖ (If clinical presentation is of hypothyroidism + elevated TSH, it is primary hypothyroidism. No need for T3, T4. if TSH is normal do T3 T4 )
- **Low Normal serum T4.**

#### Management:

Levothyroxine (T4) low as 25-50 microgram

## Hyperthyroidism & Thyrotoxicosis

### Definition

**Thyrotoxicosis:** is the clinical syndrome that results when tissues are exposed to high levels of circulating thyroid hormone.

**Hyperthyroidism:** is hyperactivity of thyroid gland.

### Etiology

- Autoimmune disease of unknown cause. (TSH receptor antibody).
- There is a strong familial predisposition.
- Peak incidence in the 20- to 40- year age.

### Conditions associated with Thyrotoxicosis:

- Diffuse toxic goiter (Graves' disease)
- Toxic adenoma (Plummer's disease)
- Toxic multinodular goiter
- Subacute thyroiditis
- Hyperthyroid phase of Hashimoto's thyroiditis
- Thyrotoxicosis factitia
- Rare: ovarian struma, metastatic thyroid carcinoma (follicular), hydatiform mole, TSH secreting pituitary tumor, pituitary resistance to T3 and T4

### Clinical features

| Clinical Manifestation of Hyperthyroidism (↑ Thyroxine) |  |
|---|--|
| <b>Skin</b>   | Sweating, Moist warm skin, palmar erythema, thin hair  |
| <b>Brain</b>  | Hyperthermia, Heat intolerance, Increase appetite, Anxiety, Insomnia, Hand tremor                            |
| <b>GIT</b>  | Hyperdefecation (diarrhea), Loose bowel motion, increase gluconeogenesis (Failure of controlling a known DM) |
| <b>Renal</b>  | Urinary frequency  |
| <b>Heart</b>  | Palpitation, Sinus tachycardia, Atrial fibrillation  |
| <b>Eye</b>  | Eyelid lag, Eyelid retraction (staring gaze)   |
| <b>Bone</b>   | Bone fracture, Osteoporosis, Hypercalcemia   |
| <b>Muscles</b>  | Muscle wasting & weakness, Hyperreflexia, Weight loss  |
| <b>Reproductive</b>                                     | Female: Menstrual cycles disturbances (Oligo-or amenorrhea)/ Male: ED  |

## Approach

### Investigations:

- **TSH-R Ab [stim]**
- **Free T3**
- **Atypical presentations:**
  - Thyrotoxic periodic paralysis more common in Asians.
  - Thyrocardiac disease.
  - Familial dysalbuminemic hyperthyroxinemia.

### Management:

#### **Medical:**

- Antithyroid drug therapy:
  - Propylthiouracil or methimazole stop thyroid hormone synthesis. If stopped remission is high. **PTU is safe for pregnancy.**
- Spontaneous remission 20-40%
- Relapse 50-60%
- Duration of treatment 6 months – years.

#### **Surgical:**

- Subtotal thyroidectomy
- Preparation for surgery
  - Complications:**
    - hypothyroidism/ hypoparathyroidism (hypocalcemia, need to give calcium and vitamin D all life).
    - Recurrent laryngeal nerve injury.

#### **Radiation:**

- Radioactive iodine therapy
- $^{131}\text{I}$  is most commonly used in pregnancy, under 15 years, severe eye disease, older patients with multinodular or toxic nodules. (RAI can make exophthalmos worse)

#### **Symptomatic:**

- **B-blockers:**
- for symptomatic treatment (palpitations, tremors)
- **SSKI super saturated potassium iodide:** controls thyrotoxicosis

# Thyroid Nodules

## Definition

Solid or fluid filled lump or protrusion in the lower anterior neck.

## Etiology

- Iodine deficiency.
- Overgrowth of normal thyroid tissue (unknown cause, and sometimes referred as thyroid adenoma)
- Thyroid cyst
- Chronic inflammation of the thyroid (thyroiditis)
- Multinodular goiter
- Thyroid cancer

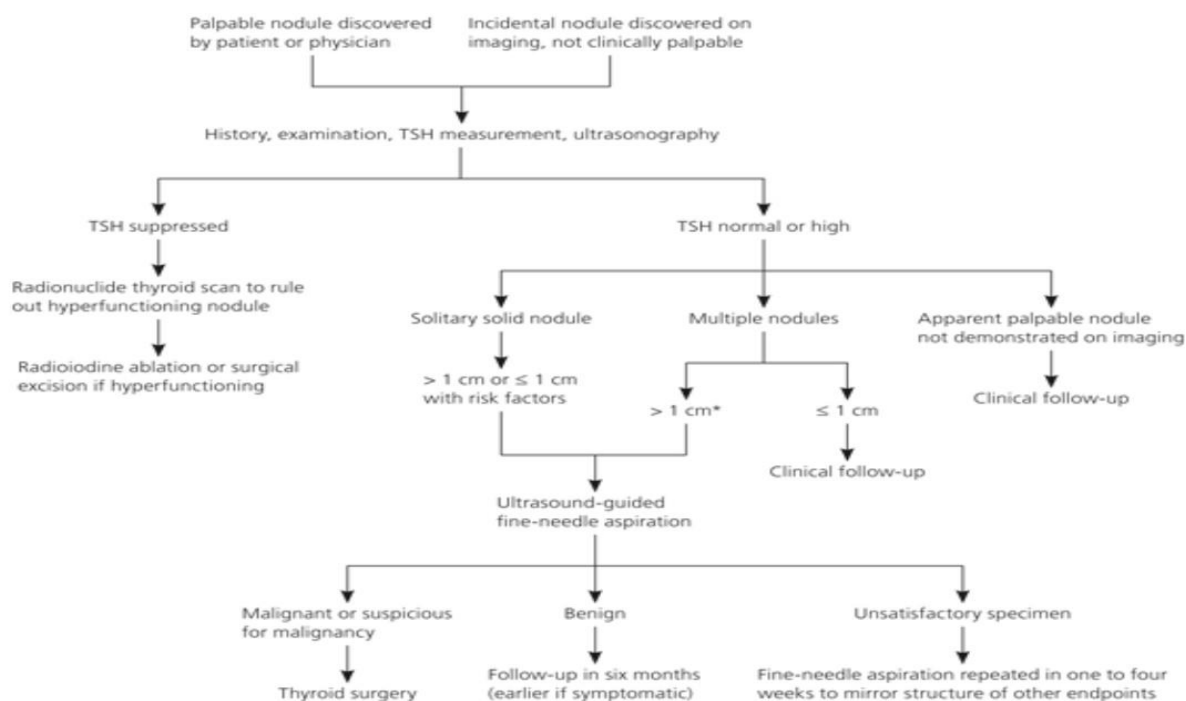
## Presentation

-Usually they present because of compressive symptoms, such as **difficulty swallowing** or a **choking sensation**. Nodules may be single or multiple, hard or soft, and tender or non-tender.

-Nodules may also be found by physicians on routine examination. Clinical examination of the thyroid is difficult in persons with large necks. Nodules 1 cm or smaller are rarely detected by palpation.

## Evaluation

### Diagnosis and Treatment of Thyroid Nodules



\*—Cutoff size for biopsy with multiple nodules not clearly established.

**Figure 1.**

Suggested diagnostic and treatment approach for thyroid nodules. (TSH = thyroid-stimulating hormone.)

Adapted with permission from Weiss RE, Lado-Abeal J. Thyroid nodules: diagnosis and therapy. *Curr Opin Oncol.* 2002;14(1):50.



## When to refer the Patient:

- ❖ **Endocrinology** referral is recommended for all patients with suspected myxedema coma and other indications, such as:
  - Age younger than 18 years.
  - Cardiac disease. (Atrial fibrillation secondary to hyperthyroidism)
  - Coexisting endocrine diseases.
  - Myxedema coma suspected.
  - Pregnancy.
  - Presence of goiter, nodule, or other structural thyroid gland abnormality.
  - Unresponsive to therapy.

## Family Medicine and Thyroid disorders:

- ❖ The first step for the patient is to consult a Family Physician, they can thoroughly explore their patients' symptoms to determine if they are attributable to the thyroid, or if the problem lies elsewhere.
- ❖ Family physicians talk through all of those conditions and about the patient as a whole, to see what might be causing the issues. If those conversations suggest hyperthyroidism or hypothyroidism, ordering lab test to measure the amount of thyroid-stimulating hormone (TSH) are the preferred method of detecting hypothyroidism and hyperthyroidism.
- ❖ In hyperthyroidism a nuclear medicine scan is considered.