

Thyroid Gland Disorders

Hyperthyroidism

Hyperthyroidism is a sustained increase in synthesis and release of thyroid hormones by the thyroid gland. It occurs more often in **women** with highest frequency in 20- to 40-year-olds.

Thyrotoxicosis refers to the physiologic effects/clinical syndrome of hypermetabolism resulting from increased circulating levels of T_3 , T_4 , or both.

Etiology and Pathophysiology

Graves' disease is an autoimmune disease of unknown etiology marked by diffuse thyroid enlargement and excessive thyroid hormone secretion.

- The patient develops antibodies to the TSH receptors.
- Graves' disease accounts for 75% of cases of hyperthyroidism.
- Precipitating factors such as insufficient iodine supply, infection, and stressful life events may interact with genetic factors to cause Graves' disease.

Toxic nodular goiters are thyroid hormone-secreting nodules that function independent of TSH stimulation.

- They called toxic if associated with hyperthyroidism.
- They are multiple or single nodules, and usually benign follicular adenomas.

Clinical Manifestations

- ✓ The clinical manifestations of hyperthyroidism are related to the effect of thyroid hormone excess.
- ✓ Excess circulating thyroid hormone directly increases metabolism. It also increases tissue sensitivity to stimulation by the sympathetic nervous system.
- Enlarged thyroid gland (goiter) and vascularization (yield to bruit over thyroid gland)
- **Increased cardiac output** and hypertension
- **Palpitations**, cardiac dysrhythmias, such as tachycardia or atrial fibrillation
- Protruding eyeballs (**exophthalmos**) possibly present due to impaired drainage from the orbit, which causes increased fat deposits and fluid (edema) in the retroorbital tissues.
- **Heat intolerance**
- A cropachy (digital clubbing and swelling of fingers)
- Increased appetite, thirst, diaphoresis, weight loss, and diarrhea
- Smooth, soft skin and hair
- Nervousness and fine tremors of hands
- Irritability, agitation, insomnia, and inability to concentrate
- Menstrual irregularities, amenorrhea, decreased libido, impotence, and decreased fertility

Complication

Thyrotoxic crisis (also called thyroid storm) is an acute, rare condition where all hyperthyroid manifestations are heightened.

- Presumed causes are additional stressors (e.g., infection, trauma, surgery).
- Manifestations include severe tachycardia, heart failure, shock, hyperthermia, restlessness, agitation, seizures, abdominal pain, nausea, vomiting, diarrhea, delirium, and coma.
- Treatment is decreasing thyroid hormone levels and clinical manifestations with drug therapy.
- Therapy is aimed at managing respiratory distress, fever reduction, fluid replacement, and management of stressors.

Diagnostic Studies

- History
- Physical examination
- Ophthalmologic examination
- ECG
- Radioactive iodine uptake (RAIU)
 - Indicated to differentiate Graves' disease (with 35% to 95% of diffused and homogenous uptake) from other forms of thyroiditis (with less than 2% of uptake)
- Laboratory tests
 - TSH (**decreased**)
 - Free thyroxine (free T₄) (**increased**)
 - Total T₃ and T₄

Collaborative Care

The overall goal in the treatment is to block adverse effects of thyroid hormones and stop hormone oversecretion

1. Drug Therapy (It is considered **NOT** curative)
 - Antithyroid drugs
 - Iodine
 - β -Adrenergic blockers
 - **Antithyroid drugs**
 - They inhibit synthesis of thyroid hormone
 - Improvement in 1 to 2 weeks
 - Good results in 4 to 8 weeks
 - Therapy for 6 to 15 months
 - Disadvantages include
 - Patient noncompliance
 - Increased rate of recurrence
 - First-line examples
 - Propylthiouracil (PTU)
 - It is taken 3 times daily. It has quick effect.
 - It blocks conversion of T₄ to T₃
 - Methimazole (Tapazole)
 - It is taken as a single dose daily

o Iodine

- Is used with other antithyroid drugs in preparation for thyroidectomy or treatment of crisis
 - It inhibit synthesis of T₃ and T₄ and **block their release into circulation**
 - It decreases vascularity of thyroid gland
- Maximal effect seen within 1 to 2 weeks
- Long-term iodine therapy is not effective because of the reduction in the therapeutic effect.
- Available forms
 - Saturated solution of potassium iodine (SSKI)
 - Lugol's solution

o β-Adrenergic blockers

- Are used for symptomatic relief of thyrotoxicosis resulting from β-adrenergic receptor stimulation caused by excess thyroid hormones.
- Propranolol (Inderal) is usually administered with other antithyroid agents.
- Atenolol (Tenormin) is used in the hyperthyroid patient with asthma or heart disease.

2. Radioactive Iodine Therapy (RAI Therapy)

- o It is the treatment of choice in nonpregnant adults
 - It damages or destroys thyroid tissue
- o It has a delayed response
 - 2 to 3 months
- o The patient is usually treated with antithyroid drugs and Inderal before and during first 3 months of RAI
- o **High incidence (80%) of posttreatment hypothyroidism**, resulting in the need for lifelong thyroid hormone replacement

3. Subtotal Thyroidectomy

- o Indications
 - Unresponsive to drug therapy
 - Very large goiters causing tracheal compression
 - Possible malignancy
 - Individual not a good candidate for RAI

Nutritional Therapy

- o High-calorie (4000 – 5000 kcal/day) diet may be ordered
 - For hunger and prevention of tissue breakdown.
- o The protein allowance 1 to 2 g/kg ideal body weight.
- o Avoid caffeine, highly seasoned foods, and high-fiber foods because they stimulate the already hyperactive GI tract.

Nursing Diagnoses

Activity intolerance *related to* fatigue, exhaustion, and heat intolerance secondary to hypermetabolism *as evidenced by* complaints of weakness, inability to perform usual activities, short attention span, memory lapses, dyspnea, tachycardia, irritability

Risk for injury: corneal ulceration *related to* decreased blinking or inability to close eyelids secondary to exophthalmos

Risk for injury *related to* fine muscle tremors, fatigue, inattentiveness, incoordination

Imbalanced nutrition: less than body requirements *related to* hypermetabolism and inadequate diet *as evidenced by* complaints of weight loss; less than optimal body weight

Anxiety *related to* lack of knowledge about management and course of disease, hypermetabolism, and agitation *as evidenced by* inability to verbalize information regarding medication and management of disease, verbalization of inability to cope with stresses, and increased metabolic activities

Insomnia *related to* hypermetabolism, nervousness, restlessness, agitation, and fine tremor *as evidenced by* frequent awakening, inability to fall asleep, reports of exhaustion and sleep deprivation

Overall Goals

- Experience relief of symptoms
- Have no serious complications related to disease or treatment
- Maintain nutritional balance
- Cooperate with therapeutic plan

Nursing Interventions

- Provide adequate rest (provide a cool and quiet environment, use light bed coverings, change linens frequently if the patient is diaphoretic, administer sedatives as prescribed, etc)
- Obtain weight daily
- Provide a high-calorie diet
- Avoid the administration of stimulants
- Administer medications, as prescribed
- Prepare client for thyroidectomy if prescribed
- As preoperative intervention, instruct the client in how to perform coughing and deep-breathing exercises and how to support the neck in the postoperative period when coughing and moving
- As postoperative interventions:
 - Monitor for respiratory distress
 - Control pain
 - Have a tracheotomy set, oxygen, and suction at the bedside
 - Maintain client in semi-Fowler position
 - Monitor surgical site every 2 hours for 24 hours for edema and for signs of bleeding; check dressing anteriorly and at the back of the neck

- o Limit client talking, and assess level of hoarseness
- o Monitor for laryngeal nerve damage, as evidenced by respiratory obstruction (as a result of edema of laryngeal nerve), high-pitched voice, and laryngeal stridor (harsh and vibratory sounds related to tetany).
 - Some hoarseness for 3 to 4 days is expected
- o Monitor for signs of hypocalcemia and tetany, which can be due to trauma to the parathyroid gland
 - Trousseau's and Chvostek's sign should be monitored to rule out **hypocalcemia**
 - Monitor them for 72 hours
 - Positive Chvostek's sign. A spasm of the facial muscles elicited by taping the facial nerve just anterior to the ear.
 - Positive Trousseau's sign. Carpal spasm can be elicited by compressing the brachial artery with a blood pressure for 3 minutes.
 - **Prepare to administer calcium gluconate as prescribed for tetany**

Hypothyroidism

Hypothyroidism results from insufficient circulating thyroid hormone.

Hypothyroidism can be **primary** or **secondary**

o **Primary**

- Related to destruction of thyroid tissue or defective hormone synthesis

o **Secondary**

- Related to pituitary disease with **decreased** TSH secretion or hypothalamic dysfunction

Task: See **Thyroid Video**

Hypothyroidism may be transient, related to thyroiditis, or from discontinuing thyroid hormone therapy

Hypothyroidism may be caused by iodine deficiency or atrophy of the thyroid gland

- Atrophy is the end result of Hashimoto's thyroiditis and Graves' disease
 - o These autoimmune diseases destroy the thyroid gland

Amiodarone and **lithium** can produce **hypothyroidism**

Clinical Manifestations

- Decreased cardiac output and contractility
- Low exercise tolerance and shortness of breath on exertion
- Fatigue and lethargy
- Personality and mood changes
- Impaired memory, slowed speech, decreased initiative, and somnolence
- Decreased GI motility and constipation
- Achlorhydria (absence of hydrochloric acid) is common
- Cold intolerance
- Hair loss
- Dry/coarse skin
- Weight gain
- Menorrhagia
- **Myxedema** (when severe)
 - Accumulation of hydrophilic mucopolysaccharides in the dermis and other tissues
 - Causes puffiness, periorbital edema, masklike effect

Complications

- Mental sluggishness
- Drowsiness
- Lethargy progressing gradually or suddenly to impairment of consciousness or coma
- Myxedema coma
 - o Medical emergency
 - o Can be precipitated by infection, drugs, cold, or trauma
 - o Characterized by subnormal temperature, hypotension, and hypoventilation
 - o Vital functions must be supported
 - o IV thyroid hormone replacement is usually administered

Diagnostic Studies

- History and physical examination
- Laboratory tests
 - Serum TSH
 - Determines cause of hypothyroidism
 - Free T₄
 - Serum T₃
 - Serum T₄
- TRH stimulation test
 - **Increase** in TSH after TRH injection suggests **hypothalamic dysfunction**
 - No change after TRH injection suggests anterior pituitary dysfunction

Collaborative Care

- Restoration of euthyroid state as safely and rapidly as possible
- Low-calorie diet is indicated to promote weight loss
- Drug therapy
 - Levothyroxine (Synthroid)
 - Must take regularly
 - Monitor for angina and cardiac dysrhythmias. ECG and cardiac enzymes may be ordered
- Monitor thyroid hormone levels and adjust (as needed)
- Patient/family teaching

Nursing Diagnoses

- Imbalanced Nutrition: More than Body Requirements
- Activity Intolerance
- Disturbed Thought Processes

Specific Nursing Care:

- Individual with myxedema coma requires acute nursing care

○ Mechanical respiratory support ○ Cardiac monitoring ○ IV thyroid hormone replacement ○ If hyponatremic, hypertonic saline may be administered ○ Monitor core temperature ○ Vitals	○ Weight ○ I&O ○ Visible edema ○ Cardiovascular response to hormone ○ Energy level ○ Mental alertness
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- Patient and family must understand replacement therapy and that it is lifelong
- Emphasize need for warm environment
- Discuss measures to minimize constipation
 - Avoid enemas because of vagal stimulation in cardiac patient
- Teach patient to notify physician immediately if signs of overdose appear
 - Orthopnea, dyspnea, rapid pulse, palpitations, nervousness, insomnia
- Avoid sedatives and narcotics because of increased sensitivity to these medications.
- Provide handouts for patients and family members with verbal instructions.