

Endocrine System: Disorders of the Thyroid and Parathyroid

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NUR 142

Endocrine System

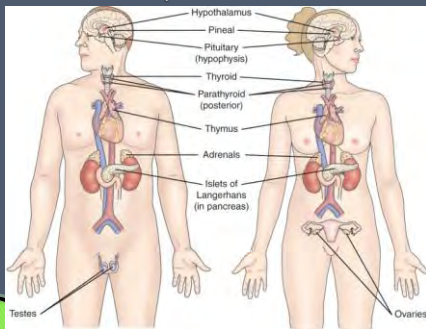


- ▶ Key Function is?
- ▶ Exert their effects on target tissues → bind to receptor sites → “Lock & Key” → target tissue changes activity
- ▶ Maintain homeostasis in response to environmental changes

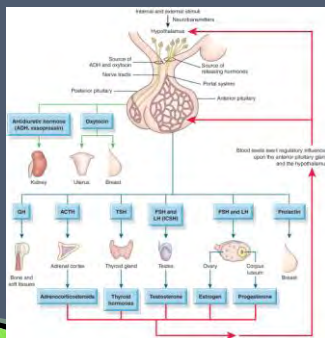
Endocrine System

- ▶ Intercellular communication network
- ▶ Hormones travel from cell to cell through the bloodstream.
- ▶ Regulates complex phenomena
 - Stress response
 - Growth and development
 - Fluid and electrolyte balance
 - Reproduction

Major Hormone Secreting Glands of the Endocrine System



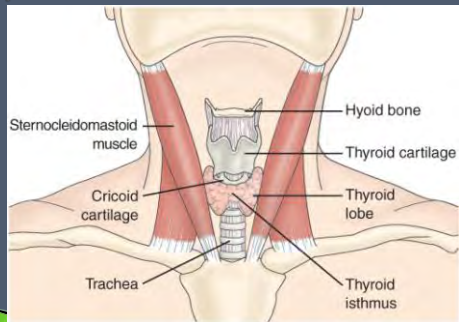
Pituitary Gland and Its Hormones



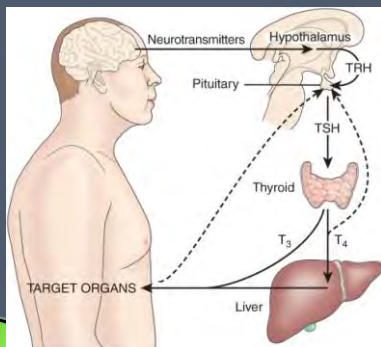
Thyroid

- ▶ Thyroid hormones: T_3 , T_4 also produces calcitonin
- ▶ Iodine is contained in thyroid hormone
- ▶ TSH from the anterior pituitary controls the release of thyroid hormone
- ▶ TRH from the hypothalamus controls the release of TSH
- ▶ Thyroid hormone controls cellular metabolic activity
- ▶ T_3 is more potent and more rapid-acting than T_4
- ▶ Calcitonin is secreted in response to high plasma calcium level and increases calcium deposition in bone

Thyroid Gland

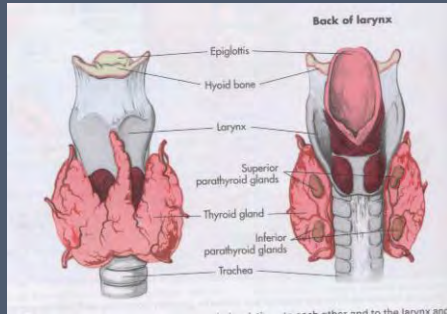


Hypothalamic-Pituitary-Thyroid Axis



Endocrine Disorders

- | | |
|--|--|
| <ul style="list-style-type: none"> ▶ Hyperfunction ▶ Etiology <ul style="list-style-type: none"> ◦ Autoimmune stimulation ◦ Secreting tumors ◦ Idiopathic ▶ Treatment <ul style="list-style-type: none"> ◦ Surgical removal ◦ Blocking drugs ◦ Irradiation | <ul style="list-style-type: none"> ▶ Hypofunction ▶ Etiology <ul style="list-style-type: none"> ◦ Autoimmune inhibition ◦ Nonsecreting tumors ◦ Surgical removal ◦ Ischemia, infarct ◦ Receptor defects ▶ Treatment <ul style="list-style-type: none"> ◦ Hormone therapy |
|--|--|



Christensen and Wockrow, Adult Health Nursing

Thyroid Hormones

- Regulation
 - If T₄ & T₃ levels in blood fall, hypothalamus produces TRH which stimulates TSH secretion by pituitary gland.
 - Calcitonin: decreases blood calcium by inhibiting bone breakdown and release of calcium.
- Function of Thyroid Hormones
 - T₃ & T₄ control cellular metabolic activity
 - Calcitonin reduces plasma levels of calcium

Thyroid Hormone Synthesis

- ▶ TSH is released by the anterior pituitary in response to TRH
- ▶ TSH release is increased by cold, stress, low thyroid hormone levels
- ▶ Feedback inhibition is through T₃ acting on hypothalamus to decrease TRH and on pituitary to down regulate TRH receptors

Calcitonin

- Decreases blood calcium levels by causing its deposition on bone
- Antagonistic to parathyroid hormone

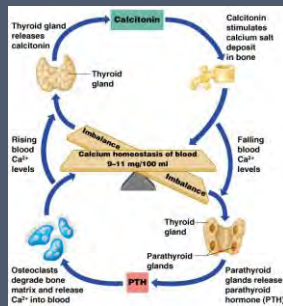


Figure 9.9

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2001, 8, 104

Thyroid Hormone - Calcitonin

- Low serum Ca and PO₄ by inhibiting bone reabsorption
- Secretion is dependent upon serum calcium level
 - involved in homeostasis
- ↓ Ca ? release of calcitonin
- ↑ Ca ? release of calcitonin

Disorders of the Thyroid and Parathyroid Gland

- Hyperthyroidism – too much thyroid hormone – patient's metabolic processes exaggerated
- Hypothyroidism – not enough thyroid hormone – slows the body's metabolic processes
- Goiter – enlarged thyroid
- Cancer – relatively rare malignancy
- Hyperparathyroidism – too much parathyroidism – elevated calcium
- Hypoparathyroidism – insufficient parathyroidism – decrease calcium

Thyroid Diagnostic Tests

- ▶ TSH
- ▶ Serum free T4
- ▶ T3 and T4
- ▶ T4 resin uptake
- ▶ Thyroid antibodies
- ▶ Radioactive iodine uptake
- ▶ Fine-needle biopsy
- ▶ Thyroid scan, radioscan, or scintiscan
- ▶ Serum thyroglobulin

Thyroid scan

- A thyroid function test that measures the absorption of the iodine isotope to determine how the thyroid gland is functioning.
- The amount of radioactivity is measured at 2, 6 and 24 hrs after ingestion of the capsule by a gamma counter being placed over the gland to measure the amount of RAI absorbed.
- Normal value is 15% to 45% in 24 hrs.
- Elevated values are indicative of hyperthyroidism, decreased iodine intake or increased iodine excretion.
- Decreased values are indicate a low T4, the use of anti-thyroid medications, Thyroiditis, Myxedema or hypothyroidism



Hyperthyroidism

- ▶ The second most prevalent endocrine disorder
- ▶ Excessive output of thyroid hormone
- ▶ Graves disease (most common cause)
- ▶ Affects women 8X more frequently than men
- ▶ Manifestations—**thyrotoxicosis**—nervousness; palpitations; rapid pulse; tolerate heat poorly; tremors; skin is flushed, warm, soft, and moist; however, elders' skin may be dry and pruritic; exophthalmos, increased appetite and dietary intake; weight loss; elevated systolic BP; may progress to cardiac dysrhythmias and failure

Etiology of Hyperthyroidism

- ▶ Autoimmune disorder
 - affects females more than males However tends to affect males more severely.
- ▶ Most common endocrine disorder
- ▶ Untreated leads to thyroid storm or thyroid crisis

Primary

- ▶ Graves' disease
- ▶ Thyroid tumor
- ▶ Thyroiditis

Secondary

- ▶ Pituitary adenoma
- ▶ Exogenous thyroid

Hyperthyroidism

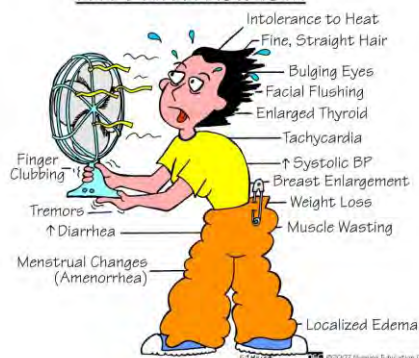
History

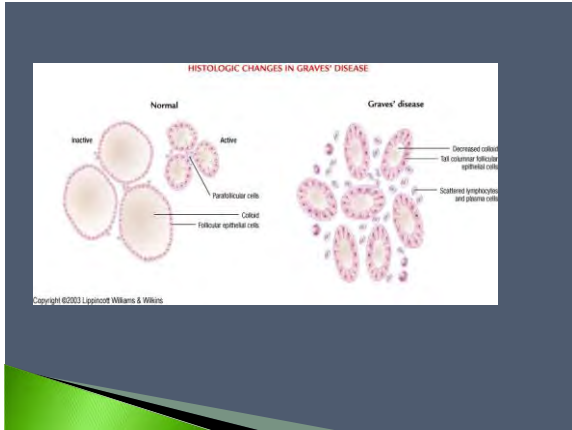
- ▶ Weight loss
- ▶ Increased appetite
- ▶ Nervousness
- ▶ Heat intolerance
- ▶ Palpitations
- ▶ Increased bowel motility

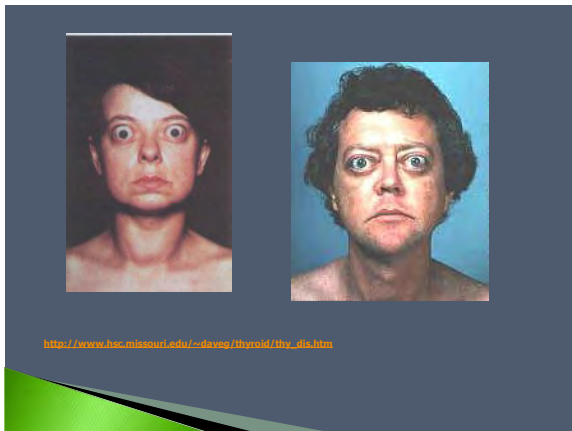
Physical

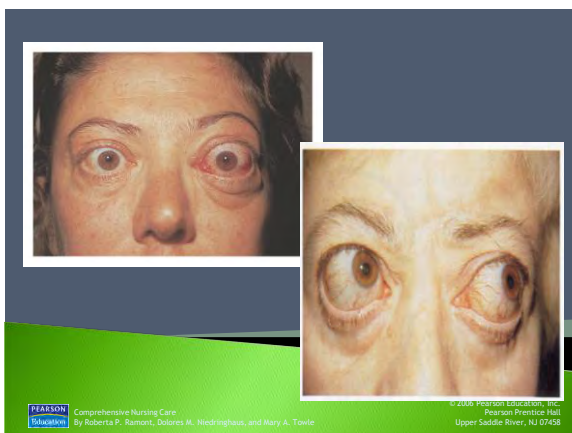
- ▶ Warm, moist skin
- ▶ Thin, fine hair
- ▶ Hair loss
- ▶ Increased BP, HR
- ▶ Hyperreflexia
- ▶ Fine tremor
- ▶ Eyelid retraction, lag
- ▶ Enlarged thyroid

HYPERTHYROIDISM

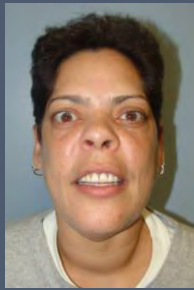


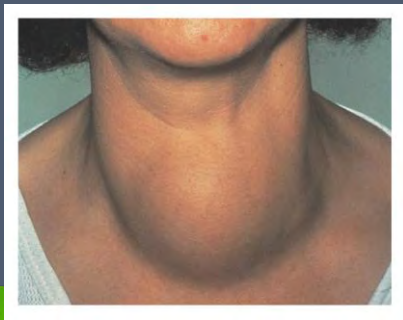






Graves Disease

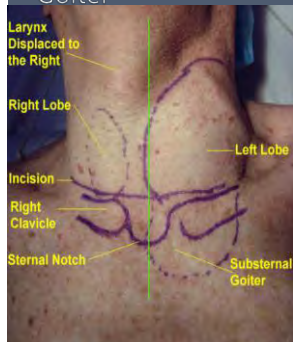




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Goiter



Same goiter in surgery and prepped for pathology



Medical Management of Hyperthyroidism

- ▶ Radioactive ^{131}I therapy
- ▶ Medications
 - Propylthiouracil and methimazole
 - Sodium or potassium iodine solutions
 - Dexamethasone
 - Beta-blockers
- ▶ Surgery; subtotal thyroidectomy
- ▶ Relapse of disorder is common
- ▶ Disease or treatment may result in hypothyroidism

Methimazole (Tapazole)



Question

Which medication blocks synthesis of thyroid hormone?

- A. Dexamethasone
- B. Methimazole
- C. Potassium iodide
- D. Sodium iodide

Thyrotoxic Crisis or Thyroid Storm

- ▶ An extreme exacerbation of severe hyperthyroidism.
- ▶ Occurs in undiagnosed or in whom the disease is inadequately treated.
- ▶ Inadequate TX is often r/t the pt's unwillingness or inability to take their routine medications.
- ▶ May be triggered by stress.
- ▶ The pt's metabolic rate increases dramatically without regard for any body system.
- ▶ This is considered a MEDICAL EMERGENCY

Clinical Manifestations

- Are more severe and life threatening
- High temp
- Dehydration
- Restlessness, irritability and apprehension
- Tachycardia, hypertension
- CHF and Pulmonary edema
- GI symptoms: nausea, vomiting and diarrhea
- Jaundice
- Psychosis, seizures
- Delirium and Coma: can lead to cardiac, hepatic or renal failure
- Can progress quickly to seizures and coma
- Severe form of life-threatening hyperthyroidism
- ▶ Prognosis: with effective treatment the patient usually improves within 24-48 hrs and is often euthyroid within one week

Nursing Care

- Monitor intake and offer frequent high-calorie, high-protein foods and snacks
- Instruct client to avoid high-fiber foods and caffeine.
- Monitor and limit stimulation, and provide rest periods during the day and between activities.
- Offer cool showers and a change of clothing when perspiration is excessive.
- Instruct client in relaxation techniques.
- Determine the extent of visual disturbance and discomfort and report to the physician and RN.
- Reinforce instruction regarding disease, treatment, and medications.

Drug	Typical adult dose	Action
Antithyroid agents propylthiouracil (also called PTU) methimazole (Tapazole)	1,200 – 1,500 mg/day, given in 200 – 250 mg increments PO or via gastric tube 120 mg given in 20 mg increments PO or via gastric tube	Prevents production of more T_4 and T_3 in the thyroid, and blocks the conversion of T_4 to T_3 outside the thyroid. Prevents production of more thyroid hormone.
Iodides Lugol's solution saturated solution of potassium iodide (Pima, SSKI)	10 drops twice a day PO or via gastric tube 8 drops every 6 hours PO or via gastric tube	Blocks release of stored thyroid hormone from thyroid gland.
Glucocorticoids dexamethasone (Decadron) hydrocortisone	2 mg every 6 hours, PO or IV 100 mg IV every 8 hours	Blocks conversion of T_4 to T_3
Beta-blockers propranolol (Inderal) esmolol (Brevibloc; injection)	1 mg/min IV as required, then 60 – 80 mg every 4 hours PO or via gastric tube 500 mcg/kg/min for 1 minute, then 50 – 100 mcg/kg/min for 4 minutes	Reduces symptoms (tachycardia, tremor, restlessness) caused by a heightened response to catecholamines; blocks conversion of T_4 to T_3

Thyroid storm: A medical emergency. Source: Travel Nursing Today By: Sally Beattie Dulak, RN, MS, CNS. CNE originally published: April 1, 2009

Hypothyroidism

- Causes: Autoimmune thyroiditis; Hashimoto's disease (most common cause)
- Affects women 5X more frequently than men
- Manifestations:
 - Early symptoms may be nonspecific
 - Fatigue; hair, skin and nail changes; numbness and tingling of fingers; menstrual disturbances, subnormal temperature and pulse; weight gain; subdued emotional and mental responses; slow speech; tongue, hands, and feet may enlarge; personality and cognitive changes; cardiac and respiratory complications
- Myxedema** may progress to stupor, coma, and death

Hypothyroidism

Primary

- Hashimoto thyroiditis
- Iatrogenic
 - Thyroidectomy
- Iodine deficiency
- More common in women aged 30 – 60
- Antithyroid medications

Secondary

- ▶ Pituitary failure

Hypothyroidism

History

- Weight gain
- Anorexia
- Fatigue/weakness
 - Sleeping 14-16 hrs/day
- Amenorrhea
- Cold intolerance
- Constipation
- Decrease libido
- Depression

Physical

- ▶ Dry, dull thick skin
- ▶ Coarse hair
- ▶ Hoarse voice
- ▶ Low HR, BP
- ▶ Periorbital edema
- Goiter – one lobe frequently larger than other
- Slow hoarse/husky speech
 - Voice husky due to edema in larynx



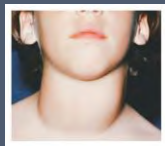
http://www.hsc.missouri.edu/~daveg/thyroid/thy_dis.htm



http://www.hsc.missouri.edu/~daveg/thyroid/thy_dis.htm



http://www.hsc.missouri.edu/~daveg/thyroid/thy_dis.htm



An enlarged thyroid gland, or goiter, is usually associated with thyroid dysfunction due to iodine deficiency.



http://www.hsc.missouri.edu/~daveg/thyroid/thy_dis.htm

Treatment

- Thyroid replacement
- Natural vs. synthetic: Synthroid
- Begin slowly: increases dose every 2-3 weeks
- Thyroid potentiates anti-coagulant therapy
- Increased sensitivity to hypnotics because of metabolizing medications
- High fiber, high protein, low calorie diet
- Warm environment
- Monitor for : tachycardia, restlessness, nervousness and insomnia

HYPOTHYROIDISM



Myxedema

- Severe Hypothyroidism in adults as a result of decreased thyroid hormone production/secretion
- Rare, serious complication of untreated hypothyroidism
- Causes:
 - Hypothyroidism in addition to any other health problems
 - Thyroid gland surgery such as thyroidectomy
 - Irradiation of the thyroid gland
 - Chronic Autoimmune Hashimoto's Thyroiditis
 - Inflammatory Conditions
 - Pituitary Failure to Produce TSH
 - Hypothalamus failure to produce TRH

Clinical Manifestations

- ▶ skin mottling
- ▶ large fontanels
- ▶ large tongue
- ▶ slow reflexes,
- ▶ distended abdomen,
- ▶ prolonged jaundice,
- ▶ somnolent infant causing feeding problems
- ▶ hoarse cry
- ▶ coarse, dry, scaly skin
- hypotension
- hypothermia
- bradycardia
- mental depression
- mood swings
- hyponatremia
- hypoglycemia
- Coma
- decrease metabolism in cardiac tissue causes heart muscle to become flabby and chamber size increase ~~~
- Decrease cardiac output
- Decrease perfusion to brain and vital organs



Myxedema Coma

- Hypothyroid Crisis – rare
- Results from a persistent low thyroid production
- Can be life-threatening, requiring immediate medical intervention
- Complication of extreme hypothyroidism
- Characterized by: severe metabolic disorders, hypothermia, cardiovascular collapse leading to coma.
- Gradual onset but is usually triggered by severe stress such as infection, exposure to cold (hypothermia) or trauma, abrupt withdrawal of thyroid medication or the use of narcotics, sedatives or anesthetics can also cause the coma.
 - Affects clients older than 60

Treatment

- ▶ When it occurs: immediate intervention is required
- ▶ Transferred to ICU
- ▶ Including but not limited to: intubation and mechanical ventilation and close monitoring
- ▶ Monitor vital signs and LOC
- ▶ Treat the signs and symptoms
- ▶ Treatment of electrolyte imbalances
- ▶ Thyroid medication (IV)
- ▶ Possibly corticosteroids
 - Hydrocortisone 100mg (IV)
- ▶ Conservation of body heat
- ▶ Narcan to reverse narcotics

Congenital Hypothyroidism (Cretinism)

- Inadequate thyroid hormone production in fetus or neonate
- Found in 1:4000 newborns
- Mandatory screening program (2-6 days)
- Gland does not produce sufficient thyroid hormone for metabolic needs
 - Not treated can lead to mental retardation
 - And impairs the development of the CNS
- Incidence: rare in US as is diagnosed by T4, TSH and x-rays of long bones





http://www.merckmanuals.com/diseases/thyroid/thy_dis.htm

Congenital Hypothyroidism (Cretinism)

Causes

- Absent, underdeveloped or ectopic thyroid gland
- Untreated maternal hypothyroidism
- Inherited enzyme defect – T₃ & T₄ don't synthesize
- Diagnosis confirmed by: Decreased levels of T₄, T₃, and increased TSH

Manifestations

- Skin mottling, large fontanels, large tongue, slow reflexes, distended abdomen, prolonged jaundice, somnolent infant causing feeding problems; hoarse cry; coarse, dry, scaly skin

Physical abnormalities

- Child generally has a large head, short limbs, puffy eyes, thick and protruding tongue, excessively dry skin and a lack of coordination

Treatment: Lifelong hormone replacement

- Levothyroxine
- If untreated the child will be permanently dwarfed, mentally retarded and sterile
- If T₄ replacement begins before epiphyseal fusion the chance for normal growth is greatly improved

Nursing Care

- Offer a high-fiber, low-calorie diet with adequate fluids.
- Administer stool softeners and laxatives as ordered.
- Promote activity to level of client's ability. Alternate activity and rest periods.
- Monitor client's orientation level and reorient as needed.
- Instruct client to be alert for signs and symptoms of hyperthyroidism.
- Reinforce client instruction about lifelong hormone therapy, disease, and treatment.

Nursing Diagnoses

- Hypothermia
- Constipation
- Activity Intolerance
- Disturbed Thought Processes

Replacement of Thyroid Hormone

- ▶ Synthetic T₄ (Synthroid)
 - Average dose is 110-120 µg/day
- ▶ Monitor TSH level
- ▶ Long-term untreated hypothyroid may have asymptomatic CAD, take care when increasing dose....angina, MI
- ▶ Overtreatment can lead to osteoporosis especially in women: if TSH too low, reduce replacement dose

Common Thyroid Medications

TABLE 29-2
Common Thyroid Medications

DRUG	PURPOSE	DOSAGE	SIDE EFFECT
Treatment of Hyperthyroidism			
Antithyroid Medications			
Tapazole/methimazole	Inhibit thyroid hormone production	15–60 mg	Hyperthyroidism Bradycardia
Propyl Thyracil/propylthiouracil		300–900 mg	
Iodine	Inhibits hormone release; decreases gland vascularity	1–5 gtt	Hypothyroidism Fatigue, weight gain Bradycardia
SSKI/potassium iodide, saturated solution		50–250 mg	
Lugol's solution/iodine solution	Relieves thyroid storm/crisis/ thyrotoxicosis	40–240 mg	Bradycardia Fatigue, weakness
Beta-Adrenergic Blockers			
Inderal/propranolol			
Treatment of Hypothyroidism			
Thyroid Drugs			
Synthroid/levothyroxine	Increase thyroid hormone blood levels	50–125 mcg	Hyperthyroidism Insomnia, palpitations Nervousness, weight loss
Levothroid		50–60 mcg	
Cytomel/liothyronine sodium		25–50 mcg	

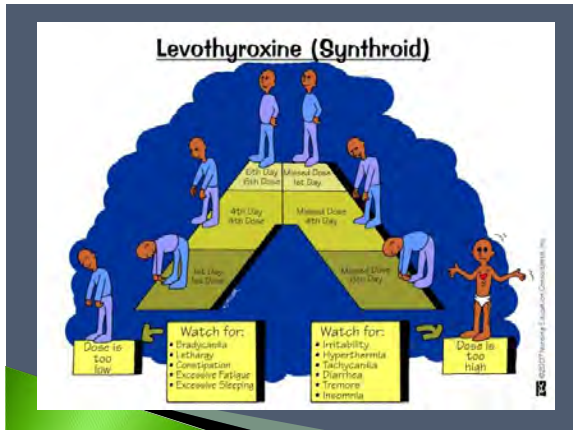
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Interactions

Drug	Effect of interaction
Digoxin, beta blockers	Decreased effectiveness of cardiac drug
Oral hypoglycemics and insulin	Increased risk for hypoglycemia
Oral anticoagulants	Prolonged bleeding

Interactions

Drug	Effect of interaction
Selective serotonin reuptake inhibitors (SSRIs), antidepressants	Decreased effectiveness of thyroid drug
All other antidepressant drug categories	Increased effectiveness of thyroid drug



Cancer of the Thyroid

- Treated with surgery to remove the gland, followed by lifelong hormone replacement therapy
- Incidence in cases is expected to increase as between 1949-1960 many infants and children through adolescence were radiated to shrink enlarged thymus glands, tonsils and adenoids and to treat severe acne
- Occurs more often in females and in Caucasians
- Incidence increases with age
- Rare but affects all age groups
 - risk for it increases with age
- Individuals who have radiation therapy are more susceptible.

Thyroid Cancer

- ▶ Papillary: most common, and can affect any age but more common in females. Grows slowly, usually contained and does not spread.
 - Cure rate after thyroidectomy is excellent
- ▶ Follicular: metastasizes to the regional lymph nodes and spreads through the blood vessels to the bone, liver and lungs.
 - It has a very low cure rate.
 - Cancer of the Thyroid
- ▶ Medullary: solid tumor, grows rapidly without treatment and will metastasize to bones, liver and kidneys.
- ▶ Anaplastic: or undifferentiated carcinoma resists radiation. It is almost never curable by radiation.
 - It metastasizes rapidly, generally causing death by invasion of the trachea and adjacent structures.
 - It generally affects individuals over the age of 60.

Cancer of the Thyroid

- ▶ Risk Factors
 - Radiation Exposure
 - especially in children and adolescents who received radiation therapy to treat severe cases of cases of acne or to shrink enlarged tonsils, adenoids, and thymus tissue
 - prolonged secretion of TSH resulting from radiation or heredity
 - Familial disposition
 - Chronic goiter

Cancer of the Thyroid

- ▶ Clinical Manifestations
 - Painless lump.
 - Hypothyroidism—as it enlarges it destroys the thyroid.
 - Although rare, it could trigger excessive thyroid production leading to signs of hyperthyroidism.
 - Dysphagia, hoarseness, and vocal stridor.
 - Disfiguring thyroid mass with a firm nodule.
- ▶ Treatment
 - Surgery: usually a total thyroidectomy
 - Radioactive iodine or external radiation therapy may be used first
 - Response of the tumor will depend on early diagnosis and treatment.
 - Methods of treatment may be used in combination or individually.

Thyroidectomy

- ▶ Treatment of choice for thyroid cancer
- ▶ Cancer surgery may include modified or radical neck dissection, and may include treatment with radioactive iodine to minimize metastasis
- ▶ Preoperative goals include the reduction of stress and anxiety to avoid precipitation of thyroid storm
- ▶ Preoperative teaching includes dietary guidance to meet patient metabolic needs and avoidance of caffeinated beverages and other stimulants, explanation of tests and procedures, and demonstration of support of head to be used postoperatively

Postoperative Care

- ▶ Monitor dressing for potential bleeding and hematoma formation; check posterior dressing
- ▶ Monitor respirations; potential airway impairment
- ▶ Assess pain and provide pain relief measures
- ▶ Semi-Fowler's position, support head
- ▶ Assess voice but discourage talking
- ▶ Potential hypocalcaemia related to injury or removal of parathyroid glands; monitor for hypocalcaemia

Nursing Care for Clients After Thyroid Surgery

- Monitor vital signs frequently, paying particular attention to respiratory rate, depth, and effort.
- Observe for restlessness, an early sign of respiratory distress.
- Provide oxygen therapy and humidification as ordered.
- Assess the throat dressing for drainage.
- Check the back of the neck for drainage.
- Instruct the client to move the head with support to prevent hyperextending the neck.
- Monitor serum calcium levels.
- Normal values are 8.5 to 10 mg/dL.

Thyroid Surgery Complications

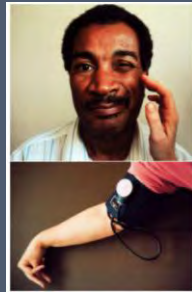
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|---|---|
| <ul style="list-style-type: none"> ▶ Respiratory Distress: <ul style="list-style-type: none"> ▶ High Fowlers position, position to provide venous drainage ▶ May occur due to edema or internal bleeding ▶ Indications of respiratory distress include: <ul style="list-style-type: none"> • Changes in respiratory rate and depth, difficulty swallowing • Restlessness • Physician may need to do emergency tracheostomy at the bedside. | <ul style="list-style-type: none"> ▶ Hemorrhage after thyroid surgery usually within first 48 hours ▶ First indications of hemorrhage may be: <ul style="list-style-type: none"> • Signs of shock • Excessive bleeding on dressing or under the head • Hypocalcemia |
|---|---|

Thyroid Surgery Complications

- Nerve Damage
 - Unilateral: hoarseness if permanent the voice will improve but complete return of the tone will not occur
 - Bilateral: paralysis to the vocal cords permanent, severe hoarseness, will thus make communication difficult
 - Laryngeal nerve damage can result from thyroid surgery.
- If laryngeal nerve damage has occurred:
 - Changes in voice: high pitched
- Hoarseness: stridor, dysphagia, restlessness
- ▶ Parathyroid Removal
 - ▶ Parathyroid glands are close to the thyroid, so one or more may be accidentally removed with thyroid tissue during surgery.

Hypocalcaemia

- Positive Chvostek's sign: an abnormal spasm of the facial muscles in response to a light tapping of the facial nerve
- Positive Trousseau's sign: a carpal spasm caused by inflating a BP cuff above the client's systolic pressure and leaving it in place for 3 min
- IV calcium gluconate or calcium chloride should be available
- Tetany (muscular spasms):
 - cardinal sign of removal of parathyroid glands



Calcitonin - Salmon (Calcimar)

"When diet alone just isn't enough...
Calcimar a bone resorption inhibitor."

Sometimes dietary calcium isn't enough. Calcitonin acts on bone to decrease osteoclast activity.

Decreases tubular reabsorption of Na and Ca. Increases absorption of Ca from GI tract.

Watch for nausea after injections (SQ or IM) and inflammation at the injection site. Nasal sprays can cause rhinitis, nasal irritation, redness and soreness.

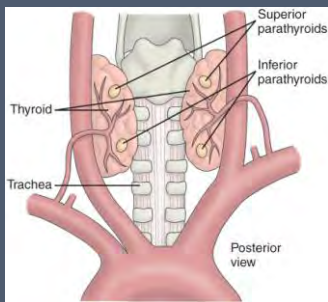
The nasal spray can also cause back pain, nose-bleeds, and headaches.

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Parathyroid

- ▶ Four glands on the posterior thyroid gland
- ▶ Parathormone regulates calcium and phosphorus balance
 - Increased parathormone elevates blood calcium by increasing calcium absorption from the kidney, intestine, and bone.
 - Parathormone lowers phosphorus level.

Parathyroid Glands



Parathyroid Glands

- Tiny masses on the posterior of the thyroid
 - Four small, beanlike structures
 - Embedded in posterior surface of thyroid gland
- Secrete parathyroid hormone (PTH)
 - Stimulate osteoclasts to remove calcium from bone
 - Stimulate the kidneys and intestine to absorb more calcium
 - Raise calcium levels in the blood
 - Calcitonin is a hypocalcemic hormone (antagonistic to PTH)
- Controls calcium and phosphorus metabolism

Parathyroid Hormone (PTH)

- Maintains calcium and phosphate balance in body
- Antagonist to Calcitonin produced by the thyroid gland
- Targets bones, kidneys, and intestinal cells to increase calcium level in blood
- Targets kidneys to increase phosphate excretion
- When PTH levels rise, phosphate is excreted and blood level of phosphate decreases
- Calcium needed for normal neuromuscular activity, cell permeability

Parathyroid Disorders

- Maintains Ca and PO₄ balance
- ↑ PTH acts directly on kidneys
 - ↓
 - ↑ Ca reabsorption, ↑ PO₄ excretion
 - ↓
 - Hypercalcemia, Hypophosphatemia

Hypoparathyroidism

- Condition caused by hyposecretion of the parathyroid hormone by the parathyroid gland.
- Causes: TB, neoplasms, trauma, massive thyroid irradiation, accidental removal during thyroid or other neck surgery
 - ◊ Condition usually occurs following thyroidectomy

Clinical Manifestations

- ▶ muscle spasms/tremors
- ▶ positive Chvostek's and Trousseau's signs
- ▶ hair loss
- ▶ brittle nails
- ▶ dry, scaly skin
- ▶ abdominal cramps
- ▶ irritability
- ▶ Seizures
- ▶ laryngospasms
- ▶ dysrhythmias
- ▶ numbness/tingling
- ▶ irritability
- ▶ depression
- ▶ psychosis
- ▶ hypocalcemia and elevated phosphorus levels

Treatment

- Monitor Vital Signs
- Monitor Cardiac Status
- Monitor for Tetany
- Initiate for seizure precautions
- *Provide a high-calcium, low-phosphorus diet*
- Aluminum hydroxide as prescribed to decrease phosphate levels
- Calcium gluconate: life long calcium treatment, vitamin D to assist with absorption of the calcium: 1 ½ hours after meals to help with absorption

Nursing Care

- Monitor serum calcium and phosphorus levels.
- Observe for signs and symptoms of tetany, and assess for positive Chvostek's and Trousseau's signs.
- Provide instruction in maintaining a high-calcium diet.
- Be aware that some foods high in calcium are also high in phosphorus.
- Clients with hypoparathyroidism need to raise calcium levels without raising phosphorus levels
- Focus on risk for injury, altered thought processes, personality changes, impaired memory, diet
- Maintain the inverse relationship between calcium and phosphorus

Hyperparathyroidism

- ▶ Primary hyperparathyroidism is 2–4X more frequent in women.
- ▶ Manifestations include elevated serum calcium, bone decalcification, renal calculi, apathy, fatigue, muscle weakness, nausea, vomiting, constipation, hypertension, cardiac dysrhythmias, psychological manifestations
- ▶ Treatment
 - Parathyroidectomy
 - Hydration therapy
 - Encourage mobility reduce calcium excretion
 - Diet: encourage fluid, avoid excess or restricted calcium

Clinical Manifestations

- ▶ Chronic low back pain
- ▶ Pathologic fractures and Bone Deformities
- ▶ Decreased muscle tone and increased muscle weakness due to high calcium
- ▶ Decreased muscle tone
- ▶ Polydipsia and polyuria
- ▶ Calcium deposits in organs
 - Renal calculi
- ▶ GI related s/s: abdominal pain, anorexia, nausea and constipation
- ▶ Dysrhythmias
- ▶ Hypertension
- ▶ Depression
- ▶ Impaired memory
- ▶ Personality changes
- ▶ Psychosis
- ▶ Stupor
- ▶ Coma
- ▶ Elevated calcium and low phosphorus levels
- ▶ S/S of Peptic Ulcers and Pancreatitis,

Treatment

- Involves decreasing calcium levels in blood
- Intravenous and oral fluids are given to dilute blood and lower the calcium level.
- Diuretics (e.g., Lasix) may be given to increase excretion of calcium in urine.
- Calcitonin may be given to prevent calcium release from bones into blood.
 - Hydration
 - IV Therapy
- If a tumor is present, surgery may be necessary.

Nursing Care

- Monitor for safety measures related to muscle weakness and pathologic fractures.
- Encourage rest periods.
- Offer frequent oral fluids, and record intake and output.
- Observe serum calcium and phosphorus levels for changes.
- Provide instruction in a diet high in phosphorus and low in calcium
- Education to avoid OTC medications with calcium, drink fluids, and remain active

Parathyroidectomy

- ▶ Primary: surgical removal of abnormal tissue, usually 3 ½ of the four parathyroid glands
- ▶ Surgery can relieve bone pain in three days but may not reverse renal damage
- ▶ Removal of one or more of the parathyroid glands
- ▶ Preoperative Care
 - Monitor electrolytes, calcium, phosphorus and magnesium levels
 - Ensure calcium levels are decreased to normal
 - Inform the client that talking may be painful for the first day or two postoperative

Post-op Intervention

- Monitor
 - For Respiratory distress
 - Place a tracheotomy set, oxygen, and suctioning at the bedside
 - Position the client in semi-Fowler's
 - Neck dressing for bleeding
 - Vital signs
 - Hypocalcemia crisis as evidenced by tingling and twitching in the extremities and face.
 - For positive Trousseau's and Chvostek's sign, which signals the potential for tetany.
 - For laryngeal nerve damage
 - Monitor for changes in voice pattern and hoarseness.
- Instruct the client in the administration of calcium and vitamin D as prescribed

Hypoparathyroidism

- ▶ Deficiency of parathormone usually due to surgery—thyroidectomy, parathyroidectomy, or radical neck dissection
- ▶ Results in hypocalcaemia and hyperphosphatemia
- ▶ Manifestations include tetany, numbness and tingling in extremities, stiffness of hands and feet, bronchospasm, laryngeal spasm, carpopedal spasm, anxiety, irritability, depression, delirium, ECG changes
 - Chvostek's sign
 - Trousseau's sign

Management of Hypoparathyroidism

- ▶ Increase serum calcium level to 9—10 mg/dL
- ▶ Calcium gluconate IV
- ▶ May also use sedatives such as pentobarbital to decrease neuromuscular irritability
- ▶ Parathormone may be administered; potential allergic reactions
- ▶ Environment free of noise, drafts, bright lights, sudden movement
- ▶ Diet high in calcium and low in phosphorus
- ▶ Vitamin D

Evaluating

- Client will have normal levels of thyroid and parathyroid hormones.
- Client will verbalize relief of pain, discomfort, and heat or cold intolerance.
- Weight will be within normal limits, without unexplained gain or loss.

Question

Is the following statement True or False?

The patient in acute hypercalcemic crisis requires close monitoring for life-threatening complications and prompt treatment to reduce serum calcium levels.
