

Caring for the Endocrine Patient

Endocrine Organ Function

- The endocrine organs are ductless glands composed of cells that synthesize hormones
- Hormones are chemical messengers
- Hormones help with regulating intracellular metabolism

Thyroid Gland

- Largest endocrine gland
- Located in the neck below the pharynx and anterior to the trach
- Two lobes
- The thyroid gland stores iodine and secretes three hormones:
 - Thyroxine, (T_4), Triiodothyronine (T_3) and Calcitonin

Function of the Thyroid

- Regulation of metabolism
- Maintains metabolic rate and growth of all tissues
- Secretion of the thyroid hormones result as a response from the TSH hormone
- Calcitonin maintains serum calcium levels by decreasing bone reabsorption

Problems with Thyroid

- Cretinism - congenital absence of the thyroid gland
- Myxedema - is a deficiency in thyroid hormones (Hypothyroidism)
- Graves' Disease - is from increased production of thyroid hormones (Hyperthyroidism)

Parathyroids

- Four Small Glands
- Embedded in the posterior lobes of the thyroid gland
- Release parathormone which helps maintain homeostasis
- The presence of this hormone tends to increase the level of calcium in the blood and the excretion of phosphates

Function of the Parathyroids

- Maintains serum calcium levels

Adrenal Glands

- Located above each kidney
- Each one consists of two parts with function as separate glands:
 - Cortex
 - Medulla

Adrenal Cortex

- Produces several hormones that are very important for life
- Mineralcorticoids (Aldosterone)
- Glucocorticoids (Cortisol)
- Gonadocorticoids (Sex hormones)

Mineralocorticoids

- Aldosterone most important because its function is to maintain homeostasis of the sodium concentration in the blood

Glucocorticoids

- Cortisone & Hydrocortisone
- Helps maintain and regulates metabolism of carbohydrates, fats and proteins
- Sex Hormones - small amounts of male and female hormones are secreted

Adrenal Medulla

- Adrenal medulla secretes the catecholamines:
 - Epinephrine
 - Norepinephrine
 - These control the “fight & flight response to stress”

Pituitary Gland

- Also known as the hypophysis
- Devided into:
 - Anterior and Posterior

Anterior Pituitary Gland

- Growth Hormone (GH)
- Thyroid Stimulating Hormone (TSH)
- Adrenocorticotrophic Hormone (ACTH)
- Follicle-Stimulating Hormone (FSH)
- Luteinizing Hormone (LH)

Posterior Pituitary Lobe

- ADH
- Oxytocin

Pancreas

- Produces Insulin in the Islet of Langerhans

Nursing Responsibilities for Diagnostic Tests & Procedures

- Blood Chemistry T_3 & T_4
- Urinalysis - may be used for 24 hour collection for hormone analysis
 - Review 24 hour urine collection
 - Collection must be stopped exactly 24 hours after started
 - First specimen should be discarded
 - Specimen must be clearly labeled
 - Identify if preservative or refrigeration is required
 - Caution if preservative contains acid

Nursing Responsibilities Continued.....

- Radioactive Iodine Uptake - measures the ability of the thyroid to concentrate ingested iodine
 - Pt will ingest small amount orally
 - Test completed in 24 hours after ingestion
 - Scintillator is held near thyroid gland
 - Patients with overactive thyroids are found to store a higher percent/underactive store less

Nursing Responsibilities

- Nurse must be alert and remember to ask patient about sensitivity to Iodine prior to several diagnostic tests!!

Disorders of the Thyroid Gland

- Simple goiter - an enlargement of the thyroid gland
 - Results when dietary iodine is insufficient for the synthesis of thyroid
 - To compensate for the inadequate amount the pituitary produces TSH and causes the thyroid to hypertrophy
 - Iodine salt has decreased incidence

Hyperthyroidism

- Too much circulating levels of thyroid hormone
- Much higher in women
- Hyperthyroidism often follows emotional stress or infection
- The increase speeds up ALL body processes and causes s/s

Hyperthyroidism

- Commonly known as Grave's Disease
- Autoimmune disorder
- Immune system produces thyroid stimulating antibodies which circulate producing an attack on the thyroid gland
- This damage stimulates thyroid tissue to enlarge resulting in increase levels of thyroid

Laboratory Findings in Hyperthyroidism

- TSH Decreased
- T₃ Increased
- T₄ Increased

Assessment of Hyperthyroidism

- Increase in metabolism
- Appetite increases
- B/P rises, tachycardia
- Skin warm, moist (perspires)
- Fine tremors of the skin
- Disturbance in menstruation
- Profound personality changes

Assessment of Hyperthyroidism

- Exophthalmos with c/o tearing and blurred vision
 - Exophthalmos produces retraction of the upper eyelid with fluid retention from the extraocular muscles and impaired venous drainage from the orbit of the eyes

Caring for the patient with Exophthalmos

- Use tinted glasses or shields as protection
- Use artificial tears to moisten eyes
- Use cool compresses to relieve irritation
- Cover or tape the eyelid shut at night if they do not shut

Treatment of Hyperthyroidism

- Goal is to reduce the activity of the thyroid gland and decrease the excessive production of Thyroxine
 - Treatment includes:
 - Antithyroid Medications
 - Surgical Removal
 - Therapeutic doses of Radioactive Iodine

Iodine Preparations

- SSKI or Iodine preparation may be given to alleviate the symptoms
- Liquids Iodine should be diluted and given with juice through a straw because of staining the teeth
- Rarely used for long term care

Nursing Responsibilities for Patients Taking Iodine Sources

- Assess for hyper-sensitivities to iodine before giving medication (Example: Shellfish)
- Dilute liquid in chocolate milk, or OJ to disguise bitter taste
- Have pt drink medications through straw to prevent discoloration of teeth

Radioactive Iodine

- Radioactive Iodine may be given for hyperthyroidism
- Oral dose given destroying the thyroid gland
- Nursing care should include wearing gloves when giving radioactive iodine and when disposing of exceta

Side Effects of Iodine Preparations

- Metallic taste in mouth
- Epigastric discomfort
- Nausea
- Vomiting

Risks for Decreased Cardiac Output

- Excess TH directly affects the heart resulting in increased rate therefore increasing oxygen demand
- Problems with the cardiac system include:
 - Hypertension
 - Tachycardia
 - Dysrhythmias and palpitations

Beta - Adrenergics

- Beta Blockers decrease the tachycardia and hypertension
- Watch B/P carefully and be aware of problems that can occur as a result of hypertension and tachycardia
- LOL medications (Propranolol) Inderal
- (Metoprolol) Lopressor, (Atenolol) Tenormin

Care for Hyperthyroidism Patient

- Observe for Exophthalmos:
 - Monitor for redness, exudate or ulceration
 - Instruct patient not to touch eyes
 - Apply eye shield when appropriate
 - Apply lubricating eye drops as needed
- Diarrhea
 - Instruct family & patient to record color, volume frequency and consistency of stools
 - Evaluate recorded intake for nutritional content
 - Monitor skin in peri area for irritaiton

Caring for the patient with Hyperthyroidism

- Provide an environment that is cool
- Decrease stress
- Balance activity with rest periods
- Decrease cardiac workload
- High calorie diet (4,000 - 5,000 calories)
- Monitor daily weights

Nursing Care for the Patient Having a Subtotal Thyroidectomy

- Prior to surgery will require good pre-op teaching including:
 - teaching the patient to support the neck by placing both hands behind the neck when sitting up in the bed to provide support for the suture line
 - patient will often be given antithyroid drugs (Iodine preparation) to make the patient Euthroid prior to surgery

Post-Operative Care of Thyroidectomy Patient

- Place in semi-fowlers position
- Observe for hemorrhage
- Monitor for hypovolemic shock(the vascularity of the gland increases the risk for hemorrhage)
- Assess for respiratory distress (Trach tray at bedside, oxygen and)
- Observe for Tetany

Assessing the Patient for Tetany

- Because the parathyroid glands are located in and near the thyroid; surgery of the thyroid gland may injure or remove the thyroid gland causing hypocalcemia and tetany
- Tetany may occur in 1 to 7 days after thyroidectomy

Tetany

- Assess for deficiency of calcium including tingling of toes, fingers, and lips, muscular twitches
- Assess for Chvostek's and Trousseau's
- Keep Calcium gluconate or calcium chloride at bedside to be given IV by RN

Hypothyroidism

- Hypothyroidism results when the thyroid gland produces an insufficient amount of thyroid hormone
- Hypothyroidism produces decrease in metabolic rate and heat production
- Hypothyroidism in adults is called Myxedema(face puffy and tongue enlarged)

Laboratory Findings in Hypothyroidism

- TSH Increased
- T₃ Decreased
- T₄ Increased

Assessment of Patient with Hypothyroidism

- Hypotension
- bradycardia
- Anemia
- Constipation
- Goiter
- Periorbital Edema
- Hypothermia

Manifestations of Hypothyroidism

- When TH production decreases the thyroid gland enlarges in a compensatory attempt to produce more hormone
- Hypothyroidism experience fluid retention, dyspnea, weight gain, dry skin and muscle stiffness, elevated cholesterol(because of decrease levels of TH causing abnormalities in lipid metabolism)

Pharmacology

- Levothyroxine (Synthroid, Levothroid)
- Liotrix (Euthroid, Thyrolar)
- These medications increase blood levels of TH, thus raising the patients metabolic rate
- Older adults usually require lower doses

Nursing Responsibilities of the patient Taking Hypothyroidism Drugs

- Give one hour before meals or 2 hours after meals
- Thyroid preparation potentiates the effects of anticoagulants
- Assess apical pulse and B/P prior to giving medication
- Watch for coronary insufficiency

Nursing Concerns for the Patient with Hypothyroidism

- Provide warm environment
- Avoid all sedatives
- Increase physical activity
- Instruct patient to take medications at the same time of the day for the rest of his/her life
- Teach patient to avoid foods with excessive iodine and sodium

Patient & Family Teaching Regarding Hypothyroid Meds

- The medication must be taken for the rest of the patients life
- Report symptoms of excess thyroid hormone (excess weight loss, palpitations, leg cramps, nervousness, insomnia)

NANDA's for the Patient with Hypothyroidism

- Altered nutrition more than body requirements related to decrease metabolism
- Ineffective thermoregulation related to decreased metabolism
- Altered tissue perfusion (Cardio-Pulmonary)

Disorders of the Parathyroid Gland

- Hyperparathyroidism - one of the most common endocrine disorders
 - Excessive secretion of the parathormone may be caused by a tumor of one of the glands causing increased production of parathormone
 - the purpose of parathormone is to maintain a constant calcium balance in the blood
 - too much of the hormone causes a calcium imbalance by allowing calcium to move from the bones into the bloodstream

Signs & Symptoms of Hyperparathyroidism

- Constipation
- Fatigue
- Depression
- Increase chance of renal stones
- Hypercalcemia and Hypophosphatemia
- Bone pain and weight loss

Treatment for Hyperparathyroidism

- Remove tumor
- Give diuretics to decrease bone absorption
- Assist with ambulation
- Assess for renal stones

Hypoparathyroidism

- Hypoparathyroidism is a deficiency of parathormone
- Usually results from surgical removal of the thyroid
- Produces decrease levels of Calcium (Hypocalcemia)
- Produces increase levels of Phosphates

Signs & Symptoms of Hypoparathyroidism

- Tetany
- Involuntary movement of extremities
- Observe for Chvostec's Sign
- Observe for Trousseau's Sign

Treatment of Hypoparathyroidism

- RN will administer Calcium IVP per MD orders
- Keep Trach tray at bedside
- Seizure precautions
- Decrease environmental stimuli
- I & O
- Encourage high calcium diet

Calcium Rich Foods

- Egg Yolks
- Milk
- Milk products
- Fortified Soy Milk
- Dark Green Leafy vegetables
- Dark Green Leafy Vegetables:
 - kale
 - Mustard
 - parsley
 - Collard Greens

Hypoparathyroidism

- For the patient with low levels of calcium, the MD will often order Aluminum Hydroxide after meals to bind with phosphates and decrease the levels of phosphates in the blood

Disorders of the Adrenal Gland

Disorders of the Adrenal Gland

- Hyperfunction
 - Cushing's syndrome
 - Pheochromocytoma
- Hypofunction
- Addison's Disease

Disorders of the Adrenal Gland

- The Adrenal Cortex is necessary for life
- Adrenocortical hormones are divided into three groups:
 - Mineralocorticoids (aldosterone - for maintaining sodium levels in blood stream)
 - Glucocorticoids - concerned with metabolic effects including carbohydrate metabolism

Glucocorticoids

- In response to ACTH secreted by the anterior pituitary the adrenal cortex secretes glucocorticoids, mineralocorticoids and a small amount of sex hormones
- Examples of Steroids:
 - Depr-Medrol Solu-Medrol
 - Decadron Solu-Cortef
 - Deltasone

Hyperfunction of the Adrenals

- Problems with over secretion of glucocorticoid results in Cushing Syndrome
- Problems with over production of the adrenal medulla results in Pheochromocytoma

Clinical Manifestations of Cushings Syndrome

- Abnormal Fat distribution
- Weight Gain
- Thick Trunk
- Skin Changes
- Purple striae
- Moon face
- Muscle Weakness
- Hyperglycemia
- Increased suseptibility to infection
- Mental changes
- Changes in secondary sex characteristics
- Amenorrhea or irregularity

Cushing's

Think SWISS

- S - Salt Retention
 - W - Water Retention
 - I - Infection prone
 - S - Sugar Excess
 - S- Sex characteristic Changes
-
- Diet - Restrict Na, Carbs and Replace potassium loss

Effects of Glucocorticoids

- Weight gain due to sodium and water retention
- Negative Nitrogen Balance due to catabolism
- Cataracts and Exophthalmos due to effects of glucocorticoids

Nursing Care for the Patient with Cushings Syndrome

- Diet Low in Calories and Sodium
- Small frequent meals
- Monitor for hyperglycemia
- Daily weight
- I & O

Hypofunction of the Adrenal Glands

- Addison's Disease is a condition characterized by a hyposecretion of cortisol by the adrenal cortex
- The cause of the wasting is unknown
- Results in a cortisol insufficiency

Clinical Manifestations of Addison's Disease

- Lethargy
- Depression
- Muscle Weakness
- Bronzing Appearance of the skin
- GI Symptoms
 - Anorexia
 - Nausea
 - Abdominal Pain
- Tachycardia
- Confusion

Treatment of Addison's Disease

- Give large doses of Glucocorticoids and Vasopressor by IV infusion
- Treatment includes IV fluids for hydration
- Bedrest to prevent physical activity
- Watch glucose levels carefully

Signs of Adrenal Crisis

- Hypotension
- Dehydration
- Hyponatremia
- Hyperglycemia
- Hypoglycemia

Pheochromocytoma

- Is a catecholamine producing tumor the adrenal medulla. May be benign or malignant.
- Symptoms are caused by hypersecretion of epinephrine and norepinephrine
- the main symptom is hypertension, other s/s include severe headaches, excessive sweating, n/v, nervousness, palpitations.

Pheochromocytoma

- Dx by 24 hour urine positive for metanephrine ,CT, MRI
- Treatment is removal of the tumor

Disorders of Pituitary Gland

- Caused by benign tumor. Growth hormone excess cause gigantism or acromegaly.
- Bones enlarge, deformities of the spine and mandible, frontal sinuses, soft tissue throughout the body enlarges.
- Hypertension, GI, visual disturbances, ha's, heart enlargement, neuropathy.
- Growth hormone level must return to normal.

Disorders of Pituitary Gland

- Treatment includes surgery, radiation, drug therapy or combination therapy.

- Hypofunction of the anterior pituitary results in dwarfism
- causes include autoimmune, infection, tumor, vascular dz.
- S/s weakness, fatigue, headache, dry skin, increased infections
- treatment -treat cause and replace growth hormone

Syndrome of Inappropriate Antidiuretic Hormone

- ADH excess caused by tumors, pulmonary infections, head trauma, stress, medications, meningitis.
- Excess ADH increases reabsorption of water into the circulation from the renal tubules.
- Fluid retention, sodium deficit, concentrated urine, muscle cramps, weakness, weight gain

Syndrome of Inappropriate Antidiuretic Hormone

- Urinary output is low and urine specific gravity is high.
- This leads to confusion, lethargy, anorexia, headache, convulsions, and coma.
- Return fluid volume to normal.
- Restrict fluid
- diuretics

Diabetes Insipidus

- Hyposecretion of ADH and vasopressin deficiency.
- Causes failure of water reabsorption in the kidney.
- S/S- dehydration, polydipsia, polyuria 4 to 24 L/day, decreased skin turgor, dry mm, inability to concentrate urine; low specific gravity 1.006 or less, HA'S, tachycardia, postural hypotension

Diabetes Insipidus

- May lead to seizures and cardiovascular problems.
- Monitor electrolytes
- administer vasopressin or DDAVP
- Monitor I&O, weights, maintain adequate fluid intake.

Diabetes

- Type I - Destruction of beta cells in the pancreatic islets results in deficiency of Insulin production - but maintains normal sensitivity to insulin action
- Type II - The main problem is resistance to insulin action
- All have impaired glucose tolerance

Diabetes

- Endogenous - produced by body
- Exogenous - produced outside the body