Chapter 56:
Caring for Clients
With Disorders of
the Endocrine
System

Anatomy and Physiology

• Endocrine glands secrete hormones directly into the bloodstream
• Play a vital role in regulating homeostatic processes of:
  – Metabolism
  – Growth
  – Fluid and electrolyte balance
  – Reproductive processes
  – Sleep and awake cycles

Figure 55-1 The glands of the endocrine system
Anatomy and Physiology

- Pituitary Gland
  - Connected by stalk to hypothalamus
  - Anterior and posterior lobes
  - Is called master gland

Figure 55-3 The hypothalamus regulates pituitary activity

Figure 55-4 The pituitary gland and the relationship to the brain
Anatomy and Physiology

- Hypothalamus
  - Between cerebrum and brain stem
  - Sends nerve impulses to posterior lobe
  - Sends hormone-releasing factors to anterior lobe
  - Secretes inhibiting hormones
- Hormone regulation
  - Feedback loop controls hormone levels
    - Negative feedback: decrease in levels stimulates gland to release
    - Positive feedback: high levels inhibits gland to release

Pituitary Gland Disorders

- Acromegaly
- Simmonds' Disease
- Diabetes Insipidus
- SIADH

Acromegaly: Hyperpituitarism “Mega Growth Hormone”

- Pathophysiology and Etiology
  - Oversecretion of GH due to hyperplasia
  - Gigantism: Oversecretion of GH before puberty
  - Dwarfism: Insufficient GH during childhood
  - Acromegaly: Oversecretion of GH during adulthood
Acromegaly: Hyperpituitarism “Mega Growth Hormone”

Signs/Symptoms:
- Coarse facial features
- Large hands/feet
- Muscle weakness
- Joint pain/stiffness
- Headaches
- Possible erectile dysfunction
- Possible amenorrhea
- Increased facial hair, deepened voice (in women)
- Organ enlargement: heart, liver, spleen
- Osteoporosis
- Partial blindness

Famous People with Acromegaly
- Tony Robbins
- Andre “The Giant”
- Chinese basketball player
- Sun Ming Ming

Diagnostics:
- MRI, CT: pituitary tumor
- X-ray: thickened long bones & skull
- Radioimmunoassay: ↑ GH
- Glucose tolerance test: ↑ GH

Medical/Surgical Mgmt:
- Removal/destruction of pituitary gland
- Replacement therapy: thyroid, sex hormones & corticosteroids
Acromegaly: Hyperpituitarism
“Mega Growth Hormone”

Nursing Management
- Monitor VS, I/O, glucose levels
- Correct fluid volume excess/deficit
- Postoperative care
- Relieve pain
- Improve nutrition
- Psychological support
- Pacing activities

Simmonds’ Disease: Hypopituitarism

Hypofunction of the anterior pituitary gland
- Pituitary destruction—no pituitary activity

Potential Causes:
- Postpartum emboli
- Partial or total hypophysectomy by surgery or radiation
- Tumor
- Tuberculosis

Simmonds’ Disease: Hypopituitarism

S/S:
- GH deficiency
  - Short stature
  - Delayed puberty
- Gonadotropin deficiency (FSH & LH)
  - Reduced libido, impotence
  - Amenorrhea
  - Gonads/genitalia atrophy
- THS deficiency
  - S/S of hypothyroidism (cold intolerance)
- Hypoglycemia
- Adrenal insufficiency (Addison’s dx)
- Premature aging with cachexia
Simmonds' Disease: Hypopituitarism

**Medical Management:**
- Lifetime hormone replacement
- If untreated = fatal

**Nursing Management:**
- Pt teaching r/t medication regimen-never miss a dose
- Monitor lab values, mental/emotional, energy, nutritional status.

Diabetes Insipidus: ↓ ADH = too much urine

Antidiuretic hormone (ADH) from posterior pituitary is insufficient.

**Causes:**
- Head trauma
- Brain tumors
- Congenital
- After hypophysectomy or other neurosurgery

**S/S:**
- Polyuria: urine output as high as 20L/24 hours
- Urine dilute with specific gravity < 1.002
- Excessive, constant thirst
- Weakness, dehydration, weight loss

**Diagnostics:**
- Fluid deprivation test-unable to concentrate urine
- Urinalysis
  - Specific gravity < 1.002
**Diabetes Insipidus:**
\[ \downarrow \text{ADH}= \text{too much urine} \]

Medical & Nursing Management:
- Synthetic ADH nasal spray
  - DDAVP
- Correct fluid volume deficit
  - PO/IV fluids
- Accurate I & O
- Daily weight
- Teaching to avoid fluid loss
- Diuretics if nephrogenic cause

**SIADH**
“Too much is inappropriate”
Renal reabsorption of water rather than normal excretion.

Causes:
- Lung/brain tumors
- CNS disorders-CVA
- Head trauma
- Drugs-vasopressin, general anesthesia, oral hypoglycemics and tricyclic antidepressants.

**SIADH**
“Too much is inappropriate”

S/S:
- Water retention
- Headache
- Muscle cramps
- Anorexia

Later:
- N/V, muscle twitching, changes in LOC
SIADH
“Too much is inappropriate”

Diagnostics:
- Serum sodium/osmolarity levels are decreased (blood is diluted)
- Urine sodium/osmolarity levels are high (urine is concentrated)

Medical Management:
- Eliminate cause
- Osmotic/loop diuretics to correct water retention
- IV 3% hypertonic sodium chloride to correct hyponatremia

Nursing Management:
- Accurate I & O
- Monitor LOC
- Vital signs
- Monitor for fluid overload
  - Confusion
  - Dyspnea, Pulmonary edema
  - Hypertension
- Monitor for hyponatremia
  - Weakness
  - Muscle cramps
  - Nausea
  - Irritability, Headache

Disorders of the Thyroid Gland
- Hyperthyroidism (Graves Disease)
- Thyrotoxic crisis
- Hypothyroidism
- Thyroid tumors
- Endemic & Multinodular goiters
- Thyroiditis
Anatomy and Physiology

Thyroid Gland hormones

- T4 and T3
  - Regulate the body's metabolic rate
- Calcitonin
  - Inhibits the release of calcium from bone
- Hyperthyroidism: ↑ synthesis of thyroid hormone
  - Overactivity (Graves' disease)
  - Change in thyroid gland (goiter)

Hyperthyroidism

S/S:
- Heat intolerance, Diaphoresis
- Tachycardia, Palpitations
- Exophthalmos
- Restless with fatigue, weakness
- Highly excitable, agitated
- Fine hand tremors-clumsiness
- Increased appetite with weight loss, diarrhea
- Neck swelling

Diagnostics:
- Blood studies: ↑ protein bound iodine, T3, T4
- Thyroid U/S: enlarged gland
- Thyroid scan: ↑ uptake of radioactive iodine

Medical/Surgical Management:
- Antithyroid med:
  - Tapazole
  - Potassium iodide (Lugol's solution)
- Radiation:
  - radioactive iodine
- Surgery:
  - subtotal or total thyroidectomy
**Hyperthyroidism**

**Nursing Management:**
- Monitor HR & BP
- Record sleep pattern, daily weights
- Encourage diet high in calories, protein, with high carb snacks
- Promote rest, avoid excess physical stimulation
- Med tx may take several weeks or more
- Nursing Care Plan 56-1, page 955-958.

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**Hyperthyroidism**

Key nursing interventions after thyroid surgery:
- Assess respiratory status
- Monitor VS, I/O, Calcium levels
- Keep calcium gluconate available
- Keep tracheostomy tray at bedside
- Keep suction equipment at bedside
- Keep patient in semi-Fowler's position
- Assess for hemorrhage
- Assess for thyroid storm

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**Thyrotoxic Crisis (Thyroid Storm)**

Abrupt, life-threatening form of hyperthyroidism.

**Causes:**
- Infection-most common
- Extreme stress
- Diabetic ketoacidosis
- Trauma
- Toxemia
- Manipulation of hyperactive thyroid gland during surgery or physical exam
- Undiagnosed or poorly treated hyperthyroidism
Thyrotoxic Crisis (Thyroid Storm)

S/S:
- Temperature may be as high as 106
- Tachycardia, cardiac dysrhythmias, chest pain, dyspnea
- Persistent vomiting
- Extreme restlessness & agitation with delirium

Diagnostics:
- ↑↑ T3 & T4

Thyrotoxic Crisis (Thyroid Storm)

Medical Management: immediate tx needed
- Antithyroid drugs
- IV corticosteroids (replace depletion)
- IV sodium iodide (prevents hormone release)
- Beta blockers (reduce cardiac effects)
- IV fluids, antipyretic measures, O2

Nursing Management:
- Monitor V/S-esp. temp., cooling blanket, ice application, cool room

Hypothyroidism

Inadequate thyroid hormone secretion that slows metabolic processes.

S/S: ↓Metabolic rate, physical/mental activity slow down
- Fatigue
- Weight gain
- Cold intolerance, hypothermia
- ↓ Pulse
- Mental sluggishness
- Masklike/unemotional expression
- Skin/hair dry, hair coarse, sparse, falls out
Hypothyroidism

**Diagnostics:**
- ↑ TSH in primary r/t negative feedback to pituitary
- ↓ T3, T4

**Medical Management:**
- Thyroid replacement therapy

**Nursing Management:**
- Assess for activity intolerance
- Patient teaching to avoid constipation
- Maintain body temperature
- Medication compliance

Myxedema

Severe hypothyroidism that can progress to coma.
- Medical emergency
- Can develop abruptly

**S/S:**
- Hypothermia
- Hypotension
- Hypoventilation

**Nursing/Medical Management:**
- Assess V/S, LOC
- Keep warm
- Monitor oxygenation
- Ensure adequate airway
- Adm. IV fluids, vasopressors, lg. doses thyroid replacement hormone

Thyroid Tumors

**Follicular adenoma** - most common benign lesion

**Papillary carcinoma** - most common malignant lesion, usually with previous head/neck radiation

**S/S:** vague
- PE reveals nodular thyroid
- Swelling in neck
- Benign tumors can cause sx of hyperthyroidism
- Malignant tumors can cause voice changes, hoarseness, difficulty swallowing.
Thyroid Tumors

Diagnostics:
- Biopsy
- Thyroid cancer suspected when gland is firm, palpable
- RAI studies (radioactive iodine)

Medical/Surgical Management:
- Benign: if no symptoms then no tx
  - If symptoms: consider surgical removal
- Malignant: partial or total removal
  - Thyroidectomy
  - HRT
  - Radiation, RAI (radiation precautions)

Endemic and Multinodular Goiters

- **Goiter**: enlarged thyroid gland
- **Endemic**: dietary iodine deficiency, inability of thyroid to use iodine, or iodine deficiency based upon increased body demands for thyroid hormones.
- **Nontoxic (simple)**: no sx of dysfunction
- **Nodular**: contain one or more areas of hyperplasia (usually endemic causes)

Goiter

S/S:
- Sense of neck fullness
- Difficulty swallowing and breathing
- Visible swelling

Diagnostics:
- Thyroid scan: enlarged gland
Goiter

**Medical Mgmt:**
- If iodine deficient—foods high in iodine, iodized salt, potassium iodine as supplement.
- Potential thyroidectomy when grossly enlarged

**Nursing Mgmt:**
- Monitor for respiratory distress, raise HOB
- Encourage prescribed diet

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Thyroiditis

Acute, subacute or chronic inflammation of thyroid gland.

- **Acute**—most common in children
  - Bacterial infection
- **Subacute** (rare)
  - Follows viral URI
  - Autoimmune during postpartum period
- **Chronic/Hashimoto’s** (most common)
  - Autoimmune disorder

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Thyroiditis

**S/S:**
- **Acute**—high fever, malaise, tenderness/swelling of thyroid gland
- **Subacute**—swollen/painful gland, chills, fever and malaise approx. 2 wks. after viral infection
- **Hashimoto’s**—enlarged gland, hypothyroidism
Thyroiditis

**Medical/Surgical Management:**
- **Acute:** admin of antibiotics
- **Subacute:** symptomatic relief with analgesics and corticosteroids
- **Hashimoto’s:** thyroid hormone replacement tx, surgery if excessively large

**Nursing Management:**
- Dependent upon type and sx
- Antipyretics, ↑ HOB, soft diet
- Surgery (see Nsg. Care Plan 57-1)
- Pt. teaching: incision care, drug regimen, s/s complications

Disorders of the Parathyroid Glands

- **Hyperparathyroidism**
- **Hypoparathyroidism**
- **Parathyroid Glands**
  - Small, bean-shaped bodies
  - Embedded within lateral lobes of the thyroid
  - Secretes PTH
    - ↑ serum calcium levels

Hyperparathyroidism

Overactivity of parathyroid gland = ↑PTH
- Affects calcium and phosphorus levels
- Primary or secondary condition

**Causes:** (primary)
- Adenoma of one of the parathyroid glands
- Results in ↑ urinary excretion of phosphorus and calcium loss from bones
- Bones demineralize
- Renal stones may develop as calcium becomes concentrated in urine
Hyperparathyroidism

Causes: (secondary)
Parathyroid secretes excessive PTH due to hypocalcemia from:
- Vitamin D deficiency
- Chronic renal failure
- Large doses of thiazide diuretics
- Excessive use of laxatives or calcium supplements

Hyperparathyroidism

S/S:
- Fatigue/muscle weakness & hypotonicity
- Cardiac dysrhythmias
- Skeletal tenderness/pain on wt bearing
- Bone breakage (pathologic fractures)
- N/V, constipation
- Genitourinary tract stones
- Uremia

Hyperparathyroidism

Diagnostics:
- ↑ serum calcium, ↑ PTH
- ↓ serum phosphorus

Medical/Surgical Management:
- Primary: Surgical removal of hypertrophied gland tissue
- Secondary: correct cause, sodium/phosphorus replacements

Nursing Management:
- I & O, ↑ fluid intake, monitor for urinary calculi
- Pt teaching: signs of hypoparathyroidism
Hypoparathyroidism

Deficiency of PTH resulting in hypocalcemia

- PTH decreases stimulation of osteoclasts resulting in ↓ release of calcium from bone

**Causes:**

- Gland trauma
- Inadvertent removal
- Genetic autoimmune disorder (rare)

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Hypoparathyroidism

**S/S Acute/sudden:**

- Tetany
- Involuntary movements
- Muscle cramping
- Tonic flexion (arm or finger)
- + Chvostek’s sign
- + Trouseau’s sign
- Laryngeal spasm-dyspnea
- Cyanosis with risk of asphyxia & cardiac dysrhythmias
- Nausea, vomiting, abdominal pain
- Seizures

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Hypoparathyroidism

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- Laryngeal spasm-dyspnea
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Hypoparathyroidism

S/S: Chronic:
- Neuromuscular irritability, muscle pain
- Constipation or diarrhea
- Numbness/tingling of arms and legs
- Loss of tooth enamel

Diagnostics:
- ↓ PTH
- ↓ Calcium
- ↑ phosphorus
- X-ray: increased bone density

Medical Management:
- IV calcium salt (calcium gluconate)
- Intubation/vent
- Longterm tx: oral calcium, vitamin D, high calcium/low phosphorus diet

Nursing Management:
- Monitor for tetany
- Monitor for +Chvostek’s/Trousseau’s
- Special care with infiltration of IV calcium
- Monitor serum calcium levels
- Emergency trach kit & resp support at bedside
- Assist with ADLs until rehab
- Pt teaching: drug/diet therapy, s/s of hyper/hypocalcemia
Adrenal Glands
Anatomy and Physiology

• Located above the kidneys
• Adrenal cortex secretes corticosteroids
• Function of corticosteroids
  – Glucocorticoids
  – Mineral corticoids
  – Sex hormones
• Adrenal medulla secretes epinephrine and norepinephrine
  – Fight-or-flight response

Disorders of the Adrenal Glands

→ Adrenal insufficiency-Addison’s Disease
→ Acute Adrenal Crisis-Addisonian Crisis
→ Pheochromocytoma
→ Cushing’s Syndrome-Adrenocortical Hyperfunction
→ Hyperaldosteronism

Addison’s Disease
(need to add more)

Chronic hypoactivity of adrenal cortex resulting in insufficient secretion of glucocorticoids (cortisol) and mineralcorticoids (aldosterone)

Primary: destruction of adrenal cortex by disease
Secondary:
  → Surgical removal of both adrenal glands
  → Hemorrhagic infarction of the glands
  → Hypopituitarism
  → Suppression of adrenal function by adm of corticosteroids
Addison’s Disease
(need to add more)

S/S:
- Hypoglycemia
- Weakness & lethargy
- Hypotension, orthostatic hypotension
- Weight loss
- Bronzed pigmentation: skin & mucous membranes
- ↑ urinary excretion of sodium w/retention of potassium
- Dehydration, reduced blood plasma volume
- Hypothermia
- Vascular collapse r/t poor myocardial tone, decreased cardiac output, weak/irreg pulse

Addison’s Disease
(need to add more)

Diagnostics:
- Adm synthetic ACTH, (Cortrosyn) = no rise in plasma and urine cortisol levels
- ↓ cortisol
- hypoglycemia
- X-ray/CT scan: abnormal adrenal glands

Addison’s Disease
(need to add more)

Medical Management:
* Primary & Secondary: daily corticosteroid replacement therapy for rest of life

Nursing Management:
- To d/c med must taper
- Patient teaching:
  - Avoid stress
  - Avoid exposure to infection
  - Avoid excessive fatigue
  - Treat infections immediately
Addison's Disease Nursing Process

- Risk for fluid volume deficit
  - I & O
  - 1500-3000mL/day
  - Daily weights
- Risk for hypoglycemia
  - Monitor blood sugar
  - Frequent meals
  - Teach signs of hypoglycemia
- Risk for injury
  - Safety precautions

Acute Adrenal Crisis
Addisonian Crisis

- Occurs with sudden adrenal gland failure
- Life-threatening endocrine emergency

Causes:
- Extreme stress
- Salt deprivation
- Infection
- Trauma
- Cold exposure
- Overexertion
- Corticosteroid therapy is suddenly stopped

Acute Adrenal Crisis
Addisonian Crisis

S/S: sudden or gradual
- Anorexia, N/V/D, abd pain
- Profound weakness
- Headache
- Intensified hypotension
- Restlessness
- Fever
- Marked B/P ↓, shock

Diagnostics: based on sx and hx
Acute Adrenal Crisis
Addisonian Crisis

**Medical Management:** emergency
- IV corticosteroids in NS and glucose
- Prophylactic antibiotic tx

**Nursing Management:**
- Recognition of S/S
- Accurate adm of corticosteroid drugs (dose and time)
- Freq VS
- Monitor for hyponatremia & hyperkalemia
- Maintain warm, quiet environment

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**Pheochromocytoma**

Usually benign tumor of adrenal medulla causing hyperfunction
- Excessive catecholamine secretion
  - Epinephrine and norepinephrine

**Causes:**
- Exercise
- Emotional distress
- Trauma-surgery
- Tumor manipulation
- Postural changes

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**S/S:**
- Hypertension
- Tachycardia
- Tachypnea
- Nervousness, tremors
- Diaphoresis
- Throbbing Headache
- N/V
- Hyperglycemia
- Polyuria
- Vertigo
Pheochromocytoma

**Diagnostics:**
- Urine studies: ↑ vanillylmandelic acid
- CT, MRI, US, aortography, retrograde pyelography-reveal tumor
- ↓ BP after phentolamine (Regitine) injection-positive for disorder

**Medical/Surgical Management:**
- Surgical removal
- Phentolamine: ↓ BP
- Alpha-adrenergic blockers: ↓ BP
- Metyrosine

**Nursing Management:**
- Monitor BP closely
- Monitor for signs of acute adrenal insufficiency

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Cushing’s Syndrome  
(getting cushy)

Excessive secretion of hormones (cortisol) by the adrenal cortex

**Causes:**
- Overproduction of ACTH by pituitary gland
- Prolonged adm of high dose corticosteroids
- Hyperplasia of adrenal cortex
- Benign or malignant tumors of pituitary gland or adrenal cortex
Cushing's Syndrome
(getting cushy)

S/S:
- Weight gain with fat redistribution
  - Truncal obesity with thin extremities
  - Moon face
- Muscle wasting, weakness (protein depletion)
- DM develops (Carbohydrate tolerance is ↓)
- Poor wound healing
- Bruises easily, striae
- Bone demineralization: kyphosis & buffalo hump
- Retention of sodium & water-peripheral edema, HTN

Cushing’s Syndrome
(getting cushy)

Diagnostics:
- Physical changes
- ↑cortisol, ↑glucose, ↑aldosterone
- Dexamethasone suppression test
  - 1mg dexamethasone is given
  - If levels are elevated, dexamethasone is given and 24hr urine collected
  - 17-ohec and 17-ks levels remain elevated in Cushing’s Syndrome

Cushing's Syndrome
Adrenocortical Hyperfunction

Medical/Surgical Management:
- Radiation or removal of pituitary
- Adrenalectomy
- Drug therapy:
  - Glucocorticoids after surgery
  - Adrenal suppressants
  - Hypoglycemics
- Diet: low Na & carbs
- Antibiotics: tx infection

Effects of Cushing’s Syndrome.
Before  
After surgery of hypertension
Hyperaldosteronism
Hypersecretion of aldosterone that creates extreme electrolyte imbalances.

**Causes:**
- primary
  - Benign tumor of adrenals
  - Malignant tumor
  - Unknown etiology
- Secondary: CHF, renal artery narrowing, cirrhosis

Hyperaldosteronism

**S/S:**
- Headache
- Muscle weakness, fatigue
- Increased urine output
- HTN
- Cardiac dysrhythmias

**Diagnostics:**
- ↑ aldosterone
- ↑ renin
- CT/MRI: adrenal tumor

Hyperaldosteronism

**Medical/Surgical Management:**
- Adrenal tumor-unilateral adrenalectomy
- Potassium-sparing diuretics
- Antihypertensives: control BP
- Sodium-restricted diet
- Potassium supplements