THYROID GLAND DISORDERS

Hypothyroidism and Hyperthyroidism

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OBJECTIVES OF THE SESSION

Review the anatomy and physiology of thyroid gland.

Discuss the disorders associated with Thyroid gland in hypothyroidism:

- Goiter (non-toxic)
- Cretinism
- Myxedema

Discuss the disorders associated with Thyroid gland in hyperthyroidism:

- Grave’s disease
- Goiter (toxic)
The thyroid gland is a butterfly-shaped organ located in the lower neck anterior to the trachea. It consists of two lateral lobes connected by an isthmus. The gland is about 5 cm long and 3 cm wide and weighs about 30 g.
Thyroid Gland
Superior thyroid artery

Larynx

Thyroid gland

Isthmus

Common carotid artery

Trachea

Inferior thyroid artery
THYROID HORMONES

1. Thyroxin (Tetra iodothyronine T4)
2. Tri iodothyronine or T3
3. Thyrocalcitonine (It lowers plasma Ca ++ level)
   - T3 and T4 are Iodinated derivative of amino acid tyrosine. T4 contains four and T3 three iodine atoms.
Thyroid-releasing hormone (TRH) from the hypothalamus stimulates the pituitary gland to secrete (TSH)

\[ \downarrow \]

TSH stimulates the thyroid to produce thyroid hormone (T3 and T4)

\[ \downarrow \]

High circulating levels of T3 and T4 inhibit further TSH secretion and thyroid hormone production through a negative feedback mechanism
ACTIONS OF THYROID HORMONES (T3 & T4)

- Increases metabolism (oxygen uptake) and protein synthesis
- Growth and development in children
- Protein metabolism
  Stimulate protein synthesis (anabolic effect) whilst excess secretions cause protein catabolism for body fuel
- Carbohydrate metabolism:
  Stimulate glucose uptake and utilization by tissues
Lipid metabolism
Decreases level of lipid and cholesterol in blood (i.e. increased cholesterol catabolism than lipogenesis.

Growth and maturation
Thyroid hormones are essential for physical, mental and sexual growth.
CONT...

Cardiovascular effects
- Increase in myocardial muscle strength
- Increased cardiac output.
- Increased blood volume
- Increased cardiac contractility

Respiratory system
An increase in rate and depth of breathing to increase body metabolism and oxygen transport.
CONT...

- **Gastrointestinal tract**
  Increase appetite, digestive juice secretion

- **Skin**
  Blood flow to skin increases to dissipate body heat
Hypothyroidism results from suboptimal levels of thyroid hormone.
Hypothyroidism

- Etiology/Pathophysiology
  - Insufficient secretion of thyroid hormones
  - Slowing of all metabolic processes
  - Failure of thyroid or insufficient secretion of TSH from pituitary gland
  - Myxedema
    - Adults
  - Cretinism
    - Newborns; congenital
CAUSES OF HYPOTHYROIDISM

1. Congenital
2. Acquired
   + Congenital
     1. Congenital lack
     2. Decrease in the secretion of thyroid hormones T3 & T4 or abnormal synthesis
     3. Deficient TSH secretion E.g. Cretinism
CRETINISM (HYPOTHYROIDISM IN CHILDREN)

It is characterized by hypothyroidism in children. The child who is hypothyroid since birth is called "Cretin"

Causes of cretinism

- Congenital absence of the thyroid
- Iodine deficiency during pregnancy.
MANIFESTATIONS OF CRETINISM

- Delay in all milestones of normal growth
- Delayed and retarded physical growth includes
  - Eruption of teeth
  - Closure of fontanels
  - Delayed sitting and walking

- Retarded mental growth
  - Speech is delayed
  - Incontinence of urine and stool
CHARACTERISTICS OF A TYPICAL CRETIN

- The face is presented with swollen eye lids, depressed nose and wide nostrils
- The abdomen is bulging due to muscle weakness
- The skin is cold, dry, and coarse with scanty hairs
- The height does not exceed one meter in adult life.
CLASSIFICATION OF HYPOTHYROIDISM

Acquired

- General slowing down of metabolic functions
- Myxedema
- Hashimotos Thyroiditis (auto immune and most common cause)

Hypo function of the thyroid gland during childhood is called “Cretinism” and if it occurs during adulthood, it is called “Myxedema”
MYXEDEMA (ACQUIRED HYPOTHYROIDISM)

- Hypothyroidism in adults causes the Myxedema
- Slow the metabolic process
- Non pitting edema
PATIENTS OF MYXEDEMA
HASHIMOTO’S THYROIDITIS

It is the inflammation of thyroid gland.
It is an autoimmune disorder wherein the antibodies attack the thyroid gland.

SYMPTOMS
- Goitre
- Fatigue
- Muscle weakness
- Weight gain
SYMPTOMS OF HYPOTHYROIDISM

- Cold intolerance
- Slow digestion
- Weight gain
- Fatigue
- Thin, coarse hair
- Brittle fingernails
- Muscle aches
- Dizziness
- Ringing in ears
- Numbness
- Carpal tunnel
- Poor memory
- Skin changes
- Voice changes
MEDICAL MANAGEMENT

PHARMACOLOGIC THERAPY

- Synthetic levothyroxine (Synthroid or Levothroid)
- Based on the patient’s serum TSH concentration. If replacement therapy is adequate, the symptoms of myxedema disappear and normal metabolic activity is resumed
NURSING DIAGNOSIS

- Activity intolerance related to fatigue and depressed cognitive process
- **GOAL**: Increased participation in activities and increased independence
- Risk for imbalanced body temperature
- **GOAL**: Maintenance of normal body temperature
- Constipation related to depressed gastrointestinal function
- **GOAL**: Return of normal bowel function
- Deficient knowledge about the therapeutic regimen for lifelong thyroid replacement therapy
- **GOAL**: Knowledge and acceptance of the prescribed therapeutic regimen
HYPERTHYROIDISM

Thyrotoxicosis is the clinical syndrome that results when tissues are exposed to high levels of circulating thyroid hormone. Because it is caused most commonly by hyper function of thyroid gland, it is often called hyperthyroidism.

Incidence

- 2 - 5% of all females between age of 30-50 yrs
- Male / female 1 : 7
ETIOLOGY OF HYPERTHYROIDISM

Primary Hyperthyroidism 98%
Thyrotoxycosis (causes)
  - Graves disease (autoimmune)
  - Multi Nodular Goiter
  - Toxic adenoma of thyroid gland

Secondary Hyperthyroidism (rare)
  - Pituitary tumors
Graves’ Disease

- Graves disease is a state of hyperthyroidism
- It is an autoimmune disorder characterized by abnormal stimulation of thyroid gland by thyroid stimulating antibodies (TSH receptor antibodies) that act through the normal TSH receptors
- It is five times more common in females
PATHOGENESIS OF GRAVES’ DISEASE

Abnormal stimulation of Thyroid gland by two thyroid stimulating antibodies

- Thyroid-stimulating antibody (TSAb)
- Growth-stimulating antibody (GSAb)

Antibodies bind to the TSH receptor of the follicular cells

Cell secretes increased levels of thyroid hormones

Hyperplasia of the thyroid gland

Hyperthyroidism leads to thyroid gland enlargement
MANIFESTATION OF GRAVES DISEASE (THYROTOXICOSIS)

General metabolism

- BMR increased up to +100 %.
- Patient can not tolerate heat.

Protein metabolism

Increased protein catabolism manifested by:

- Loss of body weight
- Muscle weakness and easy fatigability.
- Osteoporosis (decreased bone matrix density) and hypocalcaemia.
CONT...

Carbohydrate metabolism
- Glucose absorption, glycogenolysis and gluconeogenesis are stimulated.

Lipid metabolism
- Blood cholesterol and lipids are decreased
CONT...

Nervous system

- Irritable, restlessness, anxiousness, and emotionally unstable & insomnia.
- Fine tremors in the tongue and outstretched fingers

Cardiovascular system

- Tachycardia
- Sleeping pulse usually above 100 beats / minute.
- Cardiac output and systolic blood pressure are increased.
- Increased pulse pressure (different systolic and diastolic Hg)
CONT...

Respiratory system

- Increase in pulmonary ventilation, $O_2$ consumption and $CO_2$ production.

Skin

- Warm and flushed due to vasodilatation.
- Moist due to excessive sweating.
EXOPHTHALMOS

Extraocular Muscle Impairment in Exophthalmos
It is enlargement of thyroid gland. It may be accompanied with normal, hypo function or hyper function of the thyroid.

**Types of goiter**
- Simple (non – toxic) goiter
- Colloid Goiter
**SIMPLE (NON – TOXIC) GOITER**

- It is non – inflammatory, non – neoplastic enlargement of the thyroid gland, that is not initially associated with hypo or hyper secretion of thyroid hormones. Thyroid gland is enlarged with normal thyroid function (i.e. euthyroidism).
- It is due to insufficient iodine in water and soil for food stuffs.
- It may occur physiologically with the increase demand of the body to thyroid hormones e.g. at puberty and during pregnancy.
Colloid goiter is an enlargement of the thyroid gland associated with hypothyroidism. The follicles are lined with flat cells and contain large amounts of colloid.

- Colloid goiter is of 2 types:
  - Endemic colloid goiter.
  - Idiopathic colloid goiter (unknown aetiology).

**Endemic colloid goiter** is due to severe prolonged iodine deficiency leading to excessive TSH secretion which stimulates the thyroid cells to secrete large amounts of colloid (thymoglobulin).
**TOXIC GOITER**

- It is an enlargement of thyroid gland associated with hyperthyroidism.
- The follicles are lined with columnar cells and contain little amount of colloid.
- It occurs in Graves' disease due to excessive stimulation of the gland by long acting thyroid stimulators (LATS).
Compressed trachea and esophagus leading to symptom; coughing, night time chocking and sensation that food is stuck in the throat
SYMPTOMS OF HYPERTHYROIDISM

- Diarrhea and weight loss
- Eye problems
- Enlarged thyroid gland
- Hair and skin changes
- Heat intolerance
- Heart palpitations
- Clubbing
- Menstrual cycle changes
- Muscle weakness
- Easily bruised
TREATMENTS FOR HYPERTHYROIDISM

- **Radioactive iodine**
  - Typical treatment is 3-12 millicuries
  - However, this treatment can cause hypothyroidism
  - It must also be followed by thyroid replacing hormones
- **Beta-Blockers**
- **Antithyroid medication**—Propylthiouracil (PTU) or Tapazole
INDICATIONS FOR SURGERY

- Patients with very large goiters
- Goiters causing upper airway obstruction or severe dysphagia
- In a patient who also has a nonfunctional thyroid nodule, which can be a thyroid cancer, surgery can both cure the hyperthyroidism and remove the nodule.
- Moderate to severe Graves' ophthalmopathy,
- Pregnant women who are allergic to antithyroid drugs and/or are tolerating hyperthyroidism poorly
NURSING DIAGNOSIS

- Imbalanced nutrition, less than body requirements, related to exaggerated metabolic rate, excessive appetite, and increased GI activity
- Ineffective coping related to irritability, hyper excitability, apprehension, and emotional instability
- Low self-esteem related to changes in appearance, excessive appetite, and weight loss
- Altered body temperature
REFERENCES

In conclusion, people with proper medical attention and patient compliancy can lead a healthy, active lifestyle with these conditions.
Thank you
Any Questions?