Endocrine Disorders: Pituitary Dysfunction

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Alterations in Hypothalamic-Pituitary System

Difficult to study/document

- Location
- Short half-life
- Small concentrations of hormones
Alterations in Hypothalamic-Pituitary System

- Common causes – Hypothalamic Alterations
  - Head injury
  - CNS lesions/tumors
  - Surgical transection
Interrupted Hypothalamic Function

Fig. 21-2 Loss of hypothalamic hormones. GnRh, Gonadotropin-releasing hormone; TRH, thyrotropin-releasing hormone; CRH, corticotropin-releasing hormone; PIF, prolactin-release inhibiting factor; GHRH, growth hormone releasing hormone; FSH, follicle-stimulating hormone; LH, luteinizing hormone; TSH, thyroid-stimulating hormone; ACTH, adrenocorticotropic hormone.

McCance & Huether, 2014, Figure 22-1
Alterations in Anterior Pituitary: Hyperpituitarism

Pathophysiology

– Pituitary Adenomas
  • Impinge on neural structures
  • Continuous secretion from adenomatous cells in unpredictable pattern
Alterations in Anterior Pituitary: Hypopituitarism

Pathophysiology

– Inadequate hypothalamic-releasing hormones
– Damage to pituitary stalk
– Inability of pituitary gland to produce hormones

Etiology

– Ischemia - Infarction
– Removal or destruction of pituitary gland
– Compression – lesions
Alterations in Pituitary Function

**Hyperpituitarism**
- ADH
  - SIADH
- GH
  - Giantism/Acromegaly
- Prolactin
  - Galactorrhea
- TSH
  - Hyperthyroidism
- ACTH
  - Cushing’s Syndrome
- FSH and LH
  - PCOS
  - Infertility

**Hypopituitarism**
- ADH
  - Diabetes Insipidus
- GH
  - Dwarfism
- Prolactin
  - Poor breast development
  - Poor milk production
- TSH
  - Hypothyroidism
- ACTH
  - Cortisol insufficiency
- FSH and LH
  - Amenorrhea
  - Atrophic changes in sex organs
  - Decrease in body hair
SIADH

Causes

– High levels of circulating ADH in the absence of normal physiologic reason for its release
– Most commonly ectopically produced
  • Tumor cells
  • Pulmonary disorders
  • CNS disorders/inflammation
  • Post-surgical fluid shifts
  • Medications
Alterations in Posterior Pituitary Function: ADH Hypersecretion

↑ circulatory ADH

↓ urine output

↑ ECF volume

Dilutional Hyponatremia

Renal Tubules

↑ permeability to water

↑ water reabsorption

Serum Sodium < 135mEq/L

Hypoosmolarity
Diabetes Insipidus

Causes

– Decrease in ADH secretion
  • Neurogenic
    – Lesion in hypothalamus or pituitary gland
    – Interferes with ADH synthesis, transport, or release
  • Nephrogenic
    – Renal tubules insensitive to ADH
Alterations in Posterior Pituitary Function: ADH Hyposcretion/Hypofunction

- **Neurogenic**
  - ↓ ADH
  - Renal tubules cannot ↑ permeability to water
  - Excess U/O (dilute)
  - ↓ ECF volume
  - Hypernatremia

- **Nephrogenic**
  - ↓ response of renal tubules
  - Polyuria → ↓ urine SG
  - Thirst → Polydipsia
  - Serum Sodium > 145mEq/L
  - Hypersmolarity
Alterations in Anterior Pituitary: GH Hypersecretion

Bone
- Children/young adolescents - Giantism
  - Proportional growth of long bones
- Adults - Acromegaly
  - Growth of connective tissue and bony matrix
    - Enlarged face, hands and feet
    - Osteoarthritis

Renal tubules
- ↑ Phosphate reabsorption → Hyperphosphatemia

Metabolic
- CHO intolerance → Hyperglycemia (Type II DM)
- ↑ Metabolic rate
Dwarfism

Causes
- Genetic
- Hypothalamic or pituitary disorders

Primary Dwarfism
- Body proportions are normal
- Very short stature
Alterations in Anterior Pituitary: Prolactin Hypersecretion

Causes

- Prolactinomas
- Metabolic Alterations
  - Polycystic Ovarian Syndrome
  - Primary hypothyroidism
  - Renal failure
  - Dopamine antagonists – block PIF

Pathophysiology

↑ Serum Prolactin
↓ Reproductive Sx

Amenorrhea
Nonpuerperal milk production
Hirsutism
Alterations in Anterior Pituitary: Prolactin Hyposcretion

Pathophysiology

↓ Prolactin Release

↓ Serum Prolactin → ↓ Milk production in breastfeeding mother
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