

Hypopituitarism

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Objectives

- Definition
- Etiologies
- Presentations
- Diagnosis/investigations
- Management

Definition

- Hypopituitarism is the deficiency of two or more of the hormones of the anterior or posterior pituitary gland resulting from diseases of the hypothalamus or pituitary gland.
- Symptoms depend on onset, number and severity of hormone deficiencies, their target organs, age of onset, and the underlying cause.

Etiology

Structural

- Primary pituitary tumor (adenoma), carcinoma (exceptionally rare), craniopharyngioma, meningioma, secondary tumors (leukemia, lymphoma), chordoma, germinoma, Rathke's cleft cyst, apoplexy (hemorrhage).

Inflammatory/ Infiltrative disease

- Lymphocytic hypophysitis, sarcoidosis, hemochromatosis, histiocytosis X, and infection of the pituitary (tuberculosis, mycosis, syphilis).

Etiology (cont.)

Congenital deficiencies

- GnRH (Kallmann's syndrome), GHRH, TRH, CRH

Functional

- Chronic systemic illness, anorexia nervosa, excessive exercise

Other

- Head injury, (para)sellar surgery or radiotherapy, primary empty sella, post-partum necrosis (sheehan's syndrome), opiate analgesia

Physical findings & clinical presentation

Mass

- Headache
- Visual disturbances (typically as bitemporal hemianopia).
- CSF rhinorrhea
- Hyperprolactinemia

ACTH deficiency

- Fatigue and weakness, anorexia, abdominal pain, nausea, vomiting, failure to thrive in children, and hyponatremia.
- If the onset is abrupt, hypotension and shock

TSH deficiency

- Fatigue and weakness, weight gain, cold intolerance, anemia, constipation, bradycardia, hung-up reflexes, leg edema, change in voice, and hair loss.

Physical findings & clinical presentation (cont.)

Gonadotropin deficiency

- Loss of libido, erectile dysfunction, amenorrhea, hot flashes, dyspareunia, infertility, gynecomastia, decreased muscle mass, and anemia.

(hypogonadotropic hypogonadism)

GH deficiency

- Growth retardation in children, easy fatigue, hypoglycemia, lean mass is reduced and fat mass is increased, leading to obesity, decreased bone mineral density, increased low density lipoprotein cholesterol, increased inflammatory cardiovascular markers

Physical findings & clinical presentation (cont.)

PRL deficiency

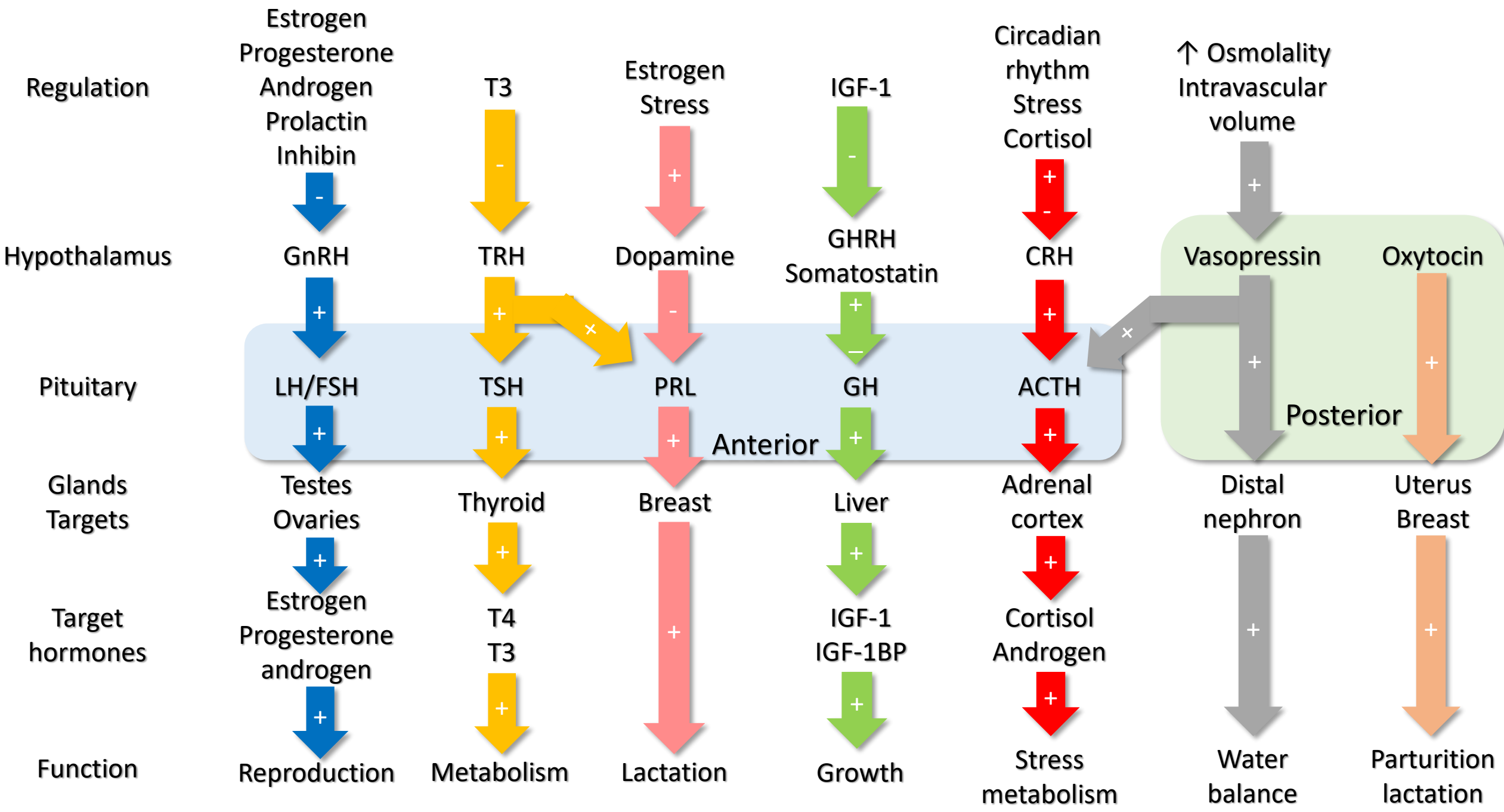
- Inability to lactate after delivery

ADH deficiency

- Diabetes insipidus with polyuria, polydipsia, nocturia, hypotension, and dehydration

Sequence of hormonal disruption





Investigations

- The TSH, ACTH, LH, FSH are inappropriately low (normal) in comparison with low end organ hormones(FT4, cortisol, estradiol and testosterone)
- Insulin tolerance test & GH stimulation under glucagon
- Combined Pituitary Function Test
- Water deprivation test (in case of polyuria and hypernatremia)
- Prolactin for hyperprolactinemia
- Visual field testing

Interpretations

**ACTH
deficiency**

- Low cortisol and normal/or low ACTH
- Abnormal normal ACTH stimulation test

**TSH
deficiency**

- Low FT4 and low/ or normal TSH

**FSH/LH
deficiency**

- For men: low testosterone and low/ or normal FSH/LH
- For women: low estradiol and low/ or normal FSH/LH

Interpretations

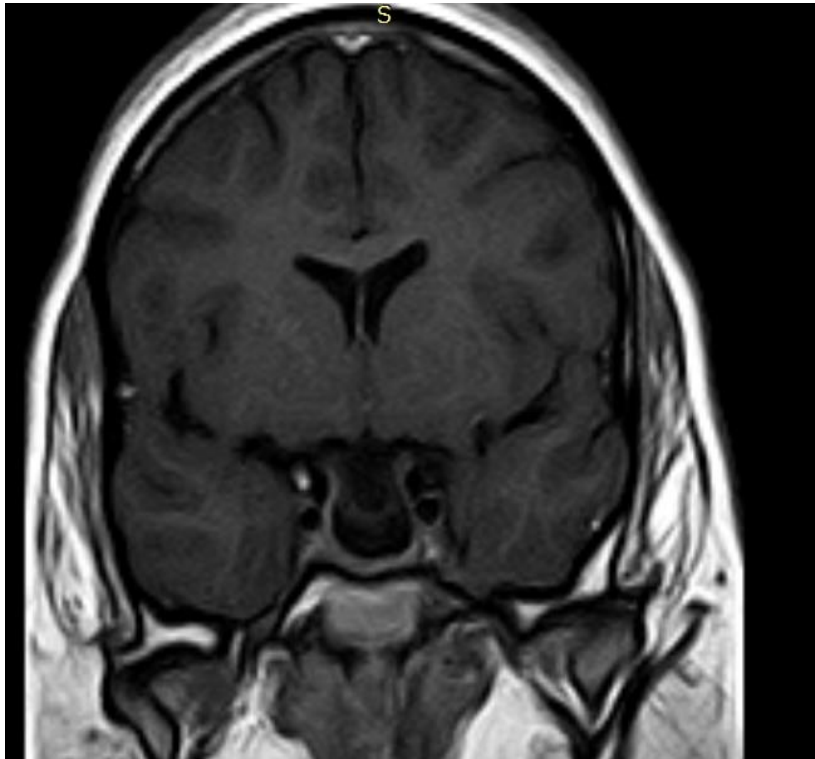
Growth hormone

- IGF-1
- Insulin tolerance test/Glucagon stimulation test.
- test using 0.1 to 0.15 unit/kg regular insulin given IV and measuring growth hormone and cortisol 0, 30, 45, 60, 90, and 120 min after administration. A normal response is a growth hormone level **>increase to >10 ng/mL**.
- This test is contraindicated in seizure disorder, IHD, severe hypoadrenalism.

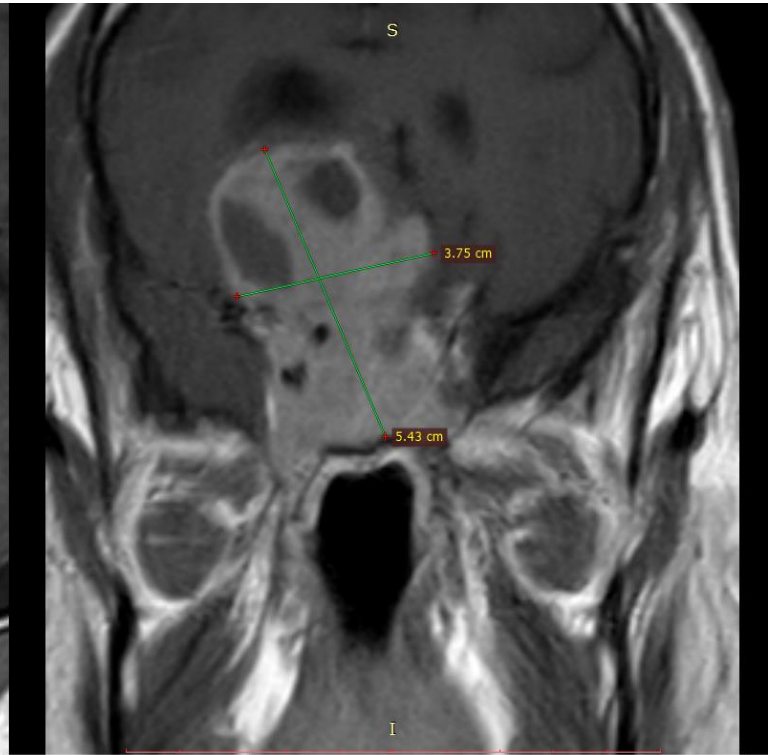
ADH

- Desmopressin responsive hypotonic urine

Imaging MRI (of choice) or CT with contrast



Hypopituitarism with chronic headache



Hypopituitarism with PRL 3000 ng/ml

Treatment

- Removal of the underlying cause
- Hormonal replacement therapy

Hormonal replacement therapy (HRT)

ACTH

- Oral hydrocortisone 10 mg am 5 mg mid day and 2.5 mg at 4 pm (15-25 mg)
- Or prednisone 5 mg in morning and 2.5 mg pm

LH/FSH

- Men: testosterone therapy
- Women: conjugated estrogen 0.3 to 1.25 mg/day and held the last 5 to 7 days of each month with the addition of medroxyprogesterone 10 mg/day given during days 15 to 25 of the normal menstrual cycle.

Hormonal replacement therapy (HRT) (cont.)

TSH	<ul style="list-style-type: none">• L-Thyroxine 50-150 µg/day
GH	<ul style="list-style-type: none">• GH replacement in children is universally accepted.• GH replacement in adults is not generally recommended. It may have effects on quality of life, body composition, bone density, and cardiovascular risk factors.
ADH	<ul style="list-style-type: none">• Desmopressin acetate (DDAVP) 10 to 40 mcg OD intranasally in one to three divided doses .

IMPORTANT MEDICAL INFO

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This patient has **Adrenal Insufficiency** and needs daily replacement therapy with corticosteroid

In the events of serious illness, coma, trauma, and vomiting and/or diarrhea, **Hydrocortisone 100 mg** IV/IM and IV Saline infusion should administered **without delay**

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هيدروكورتيزون ١٠٠ ملغم
وريدي أو عضلي مع محلول ملحي
سيلين وريدي يجب أن يعطى
بدون تأخير

Case

- The following investigations found in a 40 years man who presented with cold intolerance and fatigue:
- TSH =5 mIU/L (N 0.27-4.2 μ IU/mL),
- FT4= 0.5 (N 0.93-1.7 ng/ dL),
- Serum cortisol = 4 (N 5-25 μ g/dL),
- ACTH=10 (N 10-60 pg/mL),
- LH= 4(N 1-9 mIU/mL) ,
- Testosterone =150 (N 264-916 ng/dL).

Case

- Which of the following should be started first:
 1. Hydrocortisone
 2. L-thyroxine
 3. DDAVP
 4. Testosterone
 5. Growth hormone

Case

- The patient was then treated with hydrocortisone 20 mg in divided doses, L-thyroxine 100 Mg , and testosterone cypionate 50 mg IM every 2 weeks. After two days, the patient developed excessive urination and thirst.

Case

- What could be responsible for the patient's last two days condition?
- A. Untreated growth hormone deficiency.
- B. Hydrocortisone treatment.
- C. Diabetes mellitus.
- D. Testosterone treatment.
- E. Thyroxin treatment.

Pearls & considerations

- All patients sustaining moderate to severe head injury should undergo assessment of anterior pituitary function during the acute phase and at 6 months.
- The GH axis is the most vulnerable to the effects of radiotherapy; doses as low as 18 Gy in children have caused GH deficiency.
- Thyroxine supplementation increases the rate of cortisol metabolism and can lead to adrenal crisis, so corticosteroids should be replaced first.

Pearls & considerations

- All patients receiving glucocorticoid replacement therapy should wear proper identification stating the need for this therapy.
- Stress doses of corticosteroids are indicated before surgery or for any medical emergency (e.g., sepsis, acute myocardial infarction).
- Antidiuretic hormone deficiency may be masked if there is ACTH deficiency with symptoms only appearing when cortisol has been replaced.

THANK YOU