Adrenal Insufficiency (AI)

- Primary → Failure of adrenal glands (rare)
- Secondary → critical illness or pituitary ACTH deficiency
- Overall, most common cause of AI is iatrogenic steroids leading to axis suppression (secondary)
- Symptoms: hypoglycemia, hypotensive

Primary Adrenal failure (Addison's)

- Rare
- Most common cause is autoimmune (80%)
- Most common used to be TB
- Other causes:
  - Metastatic disease
  - Autoimmune polyglandular syndromes
  - Congenital adrenal hyperplasia
- Often presents with hyperpigmentation

Adrenal Crisis

- Bilateral adrenal hemorrhage
  - Antiphospholipid syndrome
  - DIC
  - Systemic anticoagulation
- Increased stress on chronic insufficiency (acute on chronic)

Adrenal Crisis pathophysiology

- Hypotension & shock → primarily due to loss of aldosterone (very important).
  - Aldosterone holds on to the sodium
  - Cortisol plays a smaller role, important especially during stress
- Occurs primary due to primary adrenal insufficiency. Very rarely from secondary adrenal insufficiency due to intact renin-aldosterone axis.

DIAGNOSIS

- Blood tests usually measure total cortisol, as oppose to free cortisol.
  - Results can be skewed with abnormal cortisol-binding protein or albumin level
- Early morning (8 AM) **cortisol levels:**
  - Less than 3 ug/dL → cortisol deficiency (cosyntropin testing not needed)
  - Greater than 15 ug/dL → excludes diagnosis
  - Nondiagnostic levels (5-12) → requires **cosyntropin stimulation testing**
- Once insufficiency is confirmed, figure out primary vs secondary:
  - Hyponatremia + hyperkalemia → most likely primary failure (as aldosterone is now involved)
  - Measure 8AM, **plasma ACTH** to differentiate primary vs secondary causes
    - Primary adrenal failure → ACTH = 200+ pg/dL
    - Secondary failure → low or normal ACTH

Cosyntropin testing

- Uses high dose synthetic ACTH (250 ug)
- Normal response 30 min later → cortisol level greater than 18-20 ug/dL
- Don't use during critical care setting

Primary Adrenal Deficiency **TREATMENT**

- Dangerous condition. Frequently fatal. Even when treated, mortality is high. Need mineralocorticoid in addition to glucocorticoid.
- Excess exogenous glucocorticoid → poor bone mineral density, Cushing syndrome, T2DM. Thus, must avoid chronic overreplacement.
- Hydrocortisone → closely resembles cortisol (as oppose to prednisone or dexamethasone)
  - Normally start with 12.5 – 25 mg/d dosing, divided into 2-3 doses a day
  - Supratherapeutic doses have mineralocorticoid activity as well. Doses 50+ mg/dL don't require mineralocorticoid.
- **Stress dose** → up to 200 mg/day in 4 doses of hydrocortisone for major surgery or critical illness. Lower doses for less critical illness.
- **Adrenal Crisis** → if suspected, give 100 mg hydrocortisone IV + fluids. Check cortisol and ACTH. Continue 100-200 mg / day in 3-4 divided doses till diagnosis is excluded.
- **Adrenal insufficiency + hypothyroidism** → must give glucocorticoid before levothyroxine. Otherwise → adrenal crisis

Critically ill patients & AI

- Not well understood
- Critical illness by itself may lead to adrenal insufficiency or cortisol resistance.
- Testing is unreliable.
- Some patients with shock improved with steroids. But conflicting data from septic shock.

Garg's Simple Medicine

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