ENDOCRINE
“PITUITARY“
EMERGENCIES

By

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What is Emergency?

- Emergency: A sudden need for immediate action.
- Medical emergency: Life threatening condition.
ENDOCRINE EMERGENCIES:

- MULTISYSTEM
- PRECIPITATING ILLNESS
- LIFE THREATENING
What is Pituitary?

- Master of endocrine glands.
- A federation of many specific hormone secreting cells inspite of its small weight & size ~ 600 mgm (13x6x9 mm).
- Beside secreting growth hormone & prolactin, it is the director of gonads (FSH, LH), thyroid (TSH), suprarenal cortex (ACTH).
- A good master feels the requirements of its target glands, being suppressed by over function and vice versa.
- Rarely unnecessary hormone secretion ➔ inappropriate TSH, IADHS.
PITUITARY GLAND

- Pars tuberalis
- Stalk
- Capsule
- Posterior lobe (neurohypophysis)
- Intermediate lobe (pars intermedia)
- Anterior lobe (adenohypophysis)
ENDOCRINE SYSTEM
Endocrine Emergencies

- **Diabetes mellitus:**
  - DKA - Hypos - HONK.
  - CVD (DM is a CAD equivalent).
  - HTN emergencies.
  - Kidney - AN papillitis - fulminant, emphysematus, pyelonephritis, ARF, acute on top of CRF, Sphincteric disturbance.
  - CNS, strokes, neuropathies.
  - PAD.
  - D. foot, amputations.
Endocrine Emergencies

• **Thyroid:**
  – Thyroid strom.
  – Myxedema coma.
  – Arrhythmias.
  – Ophthalmic Grave’s.
Thyroid Storm

Fever

Delerium

Cardiovascular collapse

Gastrointestinal distress
Thyroid Storm

- Life-threatening hypermetabolic state due to decompensated hyperthyroidism
- Usually results from previously unrecognized or poorly treated hyperthyroidism
- Precipitating factors:
  - Infection
Thyroid Storm

- Trauma/Surgery
- Parturition
- DKA
- MI
- CVA
- PE
- Withdrawal of thyroid meds
- Iodine load
Thyroid Storm

- 20-25% cases no precipitant found
- With treatment, mortality 20-50%
Thyroid storm

- Uncontrolled and potentially life-threatening hyperthyroidism caused by sudden excessive release of thyroid hormone (rare)

- Precipitating factors:
  - Stress,
  - Infection,
  - Unprepared thyroid surgery with manipulation of the thyroid gland
Assessment of thyroid storm

- Fever (up to 106 degree f)
- Tachycardia
- Nausea, vomiting, diarrhea
- Anxiety, agitation
- Heart failure, respiratory distress, delirium, coma
Thyroid storm management

- Maintain patent airway, adequate ventilation
- Administer antithyroid drugs, corticosteroids, sedatives, iodine solution, inderal and cardiac drugs as prescribed.
- Cooling blanket and antipyretics
Classic Features

- Fever >38.5
- Sinus tachycardia out of proportion to fever
- SVT or dysrhythmias with or without CHF
- GI symptoms (nausea, vomiting, diarrhea, rarely jaundice)
Classic Features

- Volume depletion
- CNS dysfunction (agitation, confusion, delirium, stupor, coma, seizure)
Pathophysiology

• Uncertain

• Old theory: “dumping” of T3/T4 into bloodstream

• Problem: serum levels of T3/T4 are not higher than in hyperthyroid patients not in thyroid storm
Pathophysiology

- Evidence that in thyrotoxicosis, number of catecholamine binding sites increases: heart and nervous tissues have heightened sensitivity to circulating catecholamines.
- Decreased binding of T4 and T3 to TBG.
Pathophysiology

• Stress triggers outpouring of catecholamines which, in association with high levels of free thyroid hormone precipitates thyroid storm

• Alternative hypothesis
  – Increased sensitivity of thyroid hormone receptor in target tissues secondary to acidosis or other common intermediary during times of metabolic stress
Investigations

• Clinical diagnosis
• TSH, fT4
• CBC: leukocytosis, elevated Hb
• Ca elevated in 10% due to bone resorption
• Alk phos often elevated due to activated bone remodeling
Investigations

• Hyperglycemia seen in 30-55%
  – Insulin resistance
  – Decreased insulin secretion
  – Rapid intestinal absorption
  – Increased glycogenolysis

• Minimal elevations in liver transaminases and bilirubin
Myxedema Coma

- Decompensated hypothyroidism
- Altered mental status
- Defective thermoregulation
- Precipitating illness
Myxedema Coma

IV thyroxine

IV steroids

Rewarming blankets

Respiratory support

Cardiovascular support
Myxedema Coma

IV L-thyroxine 200 - 500 ug bolus then 100 ug IV daily

IV solucortef 100 mg IV q 6h

Rewarming blankets

Respiratory support

Cardiovascular support
Myxedema Coma

- Rare condition in which an individual with longstanding hypothyroidism presents with life-threatening decompensation
- Occurs in 0.1% of patients with hypothyroidism
- Most common in older patients with underlying pulmonary or vascular disease
Myxedema Coma

- Decompensation usually triggered by precipitating event or condition
  - Cold exposure
  - *Infection (usually pulmonary)
  - *CHF
  - Trauma
  - CVA
  - Hemorrhage (especially GI)
Myxedema Coma Precipitants

- Drugs (phenothiazines, phenobarbital, Li, narcotics)
- Hypoxia, hypercapnea, hyponatremia, hypoglycemia
Pathophysiology

• 3 primary features:
  – CO2 retention and hypoxia
  – Fluid and electrolyte imbalance
  – Hypothermia
Hypercapnea and Hypoxia

- Primarily arise due to diminished medullary respiratory drive due to thyroid hormone deficiency
- Exacerbating factors:
  - Anatomic effects of severe hypothyroidism (ex. resp muscle weakness, obesity) impair normal ventilatory function
  - Pneumonia, pleural effusions
Hypercapnea and Hypoxia

- Hypercapnea is prime cause of altered sensorium
- Early neuropsychiatric features: slow responses to questions, poor short-term memory, cerebellar signs (ataxia, dysarthria, tremor) weakness, lethargy
- Later: delirium with hallucinations (myxedema madness), coma, seizures
Endocrine Emergencies

- **Parathyroid:**
  - Hyperparathyroidism, the disease of stones, bones, abdominal groans & psychosis.
  - Hypocalcemic emergencies, seizures: generalized tetany without loss of consciousness. No tongue biting, or incontinence or post-ictal confusion.
  - Psychosis, calcification of basal ganglia.
HYPOCALCEMIA

- Perioral numbness
- Tingling
- Carpal pedal spasm
- Tetany
- Laryngospasm
• IV ampule of calcium gluconate push

• IV infusion of calcium gluconate
  – 5 amps in 500 cc D5W, run at 50 - 75 cc / hr

• Monitor Chvostek, Trousseau’s signs & ionizedCa2+

• Overlap oral with IV
Chvostek’s sign

- Elicited by tapping over facial nerve causing twitching of ipsilateral facial muscles
Trousseau’s sign

- Carpal spasm in response to inflation of BP cuff to 20 mm Hg above SBP for 3 min
- Mental confusion
- Dehydration
- Abdominal pain
- Renal stones
- Ulcers
- Bony pain
HYPERCALCEMIA

- IV Hydration - Normal saline
- IV Furosemide diuresis
- 
- IV Pamidronate 60 - 90 mg IV over 6 - 24 hrs
- Calcitonin 200 IU nasally BID

- Investigate the cause
Osteitis Fibrosa Cystica

- Occurs in 10%
- Cystic bone lesions of cortical bone
- Secondary to excessive bone resorption from high PTH
- Presents with bone pain and pathologic fractures or osteoporosis
Endocrine Emergencies

• **Adrenal:**
  – Addisonian Crisis.
  – HTN complications.
  – Electrolyte disturbances.
  – Cushing’s psychosis and osteoporosis.

• **Obesity:**
  – Sleep apnea.

• **Pituitary emergencies:**
Risk factors for Addisonian Crisis

- History of other endocrine disorders
- Taking glucocorticoids for more than 3 weeks with sudden cessation
- Taking glucocorticoids more than once every other day
- Adrenalectomy
- TB
Clinical manifestations

- Fatigue, muscle weakness
- Anorexia, nausea, vomiting, abdominal pain, wt. Loss
- Hypotension, weak pulse
- Bronzelike pigmentation of the skin
Diagnostic findings

- Low cortisol levels
- ACTH stimulation test (failure of cortisol levels to rise over basal levels)
- Hyponatremia <130 meq/ml
- Hyperkalemia >5 meq/l
- Hypoglycemia
- CT
- MRI
Adrenal Crisis

- Weight Loss
- Fatigue
- Weakness
- Severe Hypotension
- Abdominal Symptoms
Adrenal Crisis

- IV steroids: Solucortef or Dexamethasone
- IV hydration

Medical Alert Bracelet
Cortisone Acetate or Prednisone
Florinef
Adrenal Crisis

IV steroids:
Solucortef 100 mg IV q 6h
or
Dexamethasone 4 mg IV q 6h

IV hydration

Medical Alert Bracelet
Cortisone Acetate or Prednisone
Florinef
Adrenal crisis

- Severe exacerbation of Addison’s disease
- Precipitating factors: trauma, strenuous exercise, infection, stress, withdrawal of exogenous steroids in a client on long term steroid therapy
- Assessment: severe muscle weakness, severe hypotension, hypovolemia, shock (vascular collapse)
Adrenal crisis interventions

- Solu-cortef iv
- Strict bedrest
- Eliminate stressful stimuli
- If infection present, administer iv antibiotics
Pituitary Emergencies

- Pituitary insufficiency → failure → secondary Addisonian Crisis.
- Pituitary infarction.
- Pituitary apoplexy.
- Posterior pituitary: SIADH secretion.
Panhypopituitarism

- Pallor, Yellowish Tinge to Skin, Alabaster skin, Failure to tan on exposure to sun
- Fine Wrinkling of Skin
- Absent Axillary & Pubic Hair
- Face Puffy & Expressionless
- Amenorrhea, Loss of libido
- Fatigability & Weakness
- Poor tolerance to RAMADAN Fasting
Pituitary Insufficiency (hypopituitarism)

- Failure of the pituitary to produce adequate amounts of one or more of its hormones.
- Lesions involving the pituitary, hypothalamus or parasellar diseases that destruct, displace or infiltrate.
- The nine:
The 9 i producing pituitary insufficiency

- Iatrogenic.
- Injury.
- Infection.
- Infarction.
- Irradiation.
- Invasion.
- Infiltration.
- Immunologic.
- Idiopathic.
1- Iatrogenic pituitary insufficiency

- Sudden cessation of steroid treatment → HPA suppression and withdrawal syndrome.
- The longer the duration > 3 weeks (> 5 days).
- The higher the dose → >7.5 mgm/d
- The timing of steroid administration being worst at midnight (the last thing before sleep).
- T4 alone to patient with pituitary insufficiency → adrenal crisis.
- High doses of synthetic progestogens (medroxyprogesterone acetate).
- After successful surgical removal of ACTH secreting pituitary adenoma.
Rule for administration of steroids

- No other option.
- How to start? What is the dosage, the duration, when & how to stop?
- Non systemic routes are preferable (ointments, inhalers, rectal).
2- Pituitary injury

- Pituitary injury, head trauma specially with fracture base.
- Surgical trauma after hypophysectomy.
4- Irradiation

Postoperative radiation therapy is beneficial (old literature).

Now only radiation for large tumour remnants.

TEROTACTIC rather than conventional radiotherapy.
5- Invasion

Tumours, meningiomas, crainopharyngioma, chordoma, glioma and parasellar aneurysms.

6- Infiltration

Sarcoidosis.
Lymphocytosis.
Lymphocytic hypophysitis.
Chromochromatosis.
3- Pituitary infections

Pyogenic: acute abscess, perisellar arachnoiditis
with sinus infections specially after
transsphenoidal surgery. MR imaging, more in
immunocompromized patient.

Common viral infections (influenza, measles,
herpes) rare.

HIV and syphilis.
7- Immunologic

Lymphocytic hypophysitis:
An autoimmune inflammatory disorder.
That occurs during pregnancy, or in the first six weeks postpartum, rarely after menopause.
Lymphocytic and plasma cell infiltrates.
Circulating anti-pituitary antibodies.

8- Idiopathic
9- Pituitary infarction

Postpartum pituitary infarction (Sheehan’s syndrome).

During pregnancy, pituitary gland, normally enlarge in response to estrogen stimulation becoming hypervascular, vulnerable to changes in BP & more prone to hemorrhage & infarction. Now relatively rare.

Hypovolemic shock ➔ adenohypophyseal vessels vasospasm and pituitary necrosis of >75% of the gland.
Diagnosis of Sheehan’s Syndrome

Clinical: severe PP hemorrhage, shock, hypotension following labour:

Severe hypos.
Severe hyponatremia.
Diminished Na/K ratio.
Hormonal verification.
Diminished cortisol.
Diminished TSH nocturnal surge.
Diminished TSH pulse frequency & pulse amplitude.
Pituitary Apoplexy:
Acute hemorrhage into a pituitary tumor
Neurosurgical emergency
Panhypopituitarism
Primary Apoplexy

- Headache
- Hypotension
- Lethargy
- Coma
Pituitary apoplexy

Pituitary apoplexy means loss of consciousness followed by paralysis.

Spontaneous hemorrhage into a pituitary adenoma after fracture base or due to HTN and/or DM, sickle-cell anemia or acute hypovolemic shock.

Within 1-2 days:

- Very severe headache and collapse
- Neck stiffness
- Progressive cranial nerve damage 3,4,5,6,7 (bilateral visual disturbances, ptosis, ophthalmoplegia).
Pituitary apoplexy

**Acute forms** of pituitary apoplexy occurring in M (Houssay phenomenon) ➔ cure of hyperglycemia and frequent episodes of hypos.

**Treatment of pituitary apoplexy:**
- Cortisol 100 mgm every 6 hours.
- Glucose saline.
- Urgent trans-sphenoidal decompression.
cerebral Apoplexy

Neurosurgery

IV steroids

IV hydration
Neurosurgery

IV Solucortef 100mg IV q6h

IV hydration

Watch for diabetes insipidus
Hypopituitarism:
- GH lost first
- LH, FSH next
- TSH
- ACTH
- Prolactin
The pattern (the march) of pituitary failure

- Growth hormone ➔
- SH, LH ➔
- GH ➔
- CTH)
endocrine emergencies?

Common.
Curable.

diagnose the common and treat the curable.
Take home message

Endocrine emergencies other than those associated with diabetes DO exist and must be considered in our differential diagnoses.

Hyxedema coma is a rare condition characterized by respiratory failure, hypothermia, and fluid and electrolyte disturbances. Treatment consists of airway and ventilatory support, initiation of levothyroxine therapy, and treatment of the precipitating cause.
Take home message

Thyroid storm is an acute exacerbation of all of the symptoms of thyrotoxicosis which can be life-threatening. Treatment consists of ABC support, blockade of excessive catecholamine activity with propranolol, inhibition of the synthesis of new thyroid hormone with PTU, blockade of peripheral conversion of T4 to T3 with hydrocortisone, and treatment of the precipitating cause.
Hypoparathyroidism is most commonly atrogenic following neck surgery. It may result in hypocalcemia which, if severe, should be treated with IV Ca.

Take home message

Hypoparathyroidism is most commonly atrogenic following neck surgery. It may result in hypocalcemia which, if severe, should be treated with IV Ca.
Primary hyperparathyroidism is the most common cause of symptomatic hypercalcemia. Severe cases of hypercalcemia should be treated with a combination of vigorous rehydration, loop diuretics, and medications such as pamidronate and calcitonin to inhibit osteoclastic bone resorption.

Take home message
Take home message

Endocrine emergencies are NOT rare and are threatsening.

Prompt recognition and treatment makes a difference to outcome.

Look for the precipitating factor and remember prevention.
Take home message

pituitary failure as adult endocrinopathies are not uncommon.

Clinical suspicion is the cornerstone for their prediction.

Stressful conditions usually trigger the acute or the chronic silent endocrinopathies.

Previous head trauma, irradiation, steroid administration can precipitate secondary adrenal crisis.
future hope.

Start now.

Could I live to see this dream.
Thank You