Inpatient Endocrinology Pearls

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Disclosures

I am a consultant to:
Pfizer, Inc. on the topic of smoking cessation
Vivus, Inc. on the topics of weight management and sexual dysfunction (I am also a shareholder)
HealthEquityLabs.com on the topic of mobile health and disease prevention

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Inpatient Endocrine Pearls

Inpatient internal medicine physicians may be asked to treat ~12 endocrine emergencies

Goals of presentation:
- Define an "endocrine emergency"
- Two illustrative case studies
- Work through the key "action steps" for the other endocrine emergencies
- Review overarching principles

What Causes an Endocrine Emergency?

Rapid increase or lowering of a key hormone(s) resulting in instability of pulse, blood pressure, fluid/electrolyte balance, respiration, and/or mentation
Endocrine Conditions that Require Urgent In-Hospital Consultation

First Six

- Diabetic ketoacidosis
- Diabetic hyperosmolar nonketotic coma
- Hypoglycemia
- Diabetes insipidus
- Pituitary apoplexy
- Addisonian crisis

Case Study 1

47-year-old man complaining of frequent headaches and bitemporal hemianopsia
Case Study 1

47-year-old man complaining of frequent headaches and bitemporal hemianopsia. He awakens one morning with an excruciating headache, nausea, dizziness, and double vision. He is brought to the ER with a BP of 80/50 and a right third-nerve palsy.

What is the diagnosis?

Pituitary Apoplexy

Spontaneous hemorrhage into a pituitary tumor, leading to infarction

Clinical symptoms:
- severe headache
- loss of vision
- cranial nerve deficits
- mental obtundation
- hypotension
- hyperthermia

Biochemically: panhypopituitarism
Anatomy of the Cavernous Sinus

Oblique section through the cavernous sinus

Normal Pituitary MRI (T1 coronal)
Treatment of Pituitary Apoplexy

Neurosurgery to evacuate clots and necrotic tissue
Consider conservative medical treatment if there is no visual compromise


Hormonal replacement

- glucocorticoids: IV hydrocortisone 50-100 mg q6-8 h
- mineralocorticoids:
  - not usually needed because zona glomerulosa, which makes aldosterone, is relatively ACTH independent
- thyroid, gonadal steroids:
  - at your leisure
Table compiled from various literature sources

Relative Glucocorticoid and Mineralocorticoid Potency of Natural Adrenal Steroids and Some Derivatives

<table>
<thead>
<tr>
<th></th>
<th>Glucocorticoid</th>
<th>Mineralocorticoid</th>
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</thead>
<tbody>
<tr>
<td>Cortisol</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Prednisone (1.2 double bond)</td>
<td>4</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>6α-Methylprednisone</td>
<td>5</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>9α-Fluoro-16α-hydroxyprednisolone (triamcinolone)</td>
<td>5</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>9α-Fluoro-16α-methylprednisolone (dexamethasone)</td>
<td>30</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Aldosterone</td>
<td>0.25</td>
<td>500</td>
</tr>
<tr>
<td>Deoxycorticosterone</td>
<td>0.01</td>
<td>30</td>
</tr>
<tr>
<td>9α-Fluorocortisol (fludrocortisone)</td>
<td>10</td>
<td>500</td>
</tr>
</tbody>
</table>

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**First Six**
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Endocrine Conditions that Require Urgent In-Hospital Consultation

- Hypercalcemic crisis
- Hypocalcemic tetany
- Myxedema coma
- Thyroid storm
- Pheochromocytoma-induced hypertension
- Carcinoid crisis

Second Six

- Diabetic ketoacidosis
- Diabetic hyperosmolar nonketotic coma
- Hypoglycemia
- Diabetes insipidus
- Pituitary apoplexy
- Addisonian crisis

Case Study 2:

A 26-year-old woman is brought to the ER with fever, tachycardia, and shortness of breath. Pulse in the ER is 160 and irregularly irregular. ECG shows atrial fibrillation with a rapid VR. BP is 160/50. T is 39.2 degrees C. There is a 2/6 systolic murmur at the base and no diastolic murmur.
Thyroid Landmarks

SCHOOL OF MEDICINE * UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Thyroid Landmarks
Thyroid Storm

Life-threatening exacerbation of hyperthyroid state leading to decompensation in one or more organ systems
Incidence is rare: <10% of patients hospitalized for hyperthyroidism
Mortality can be as high as 20% to 30%
Most commonly seen in patients with underlying Graves’ disease
Clinical presentation
  - tachycardia, atrial more than ventricular arrhythmias, systolic hypertension
  - fever
  - mental status change, from agitation to obtundation/coma
  - glucose intolerance, mild hypercalcemia

Thyrotoxic Stare vs. Thyroid Eye Disease (Graves’ Ophthalmopathy)
Measuring Orbital Protrusion

Luedde Exophthalmometer (~$30)

Hertel Exophthalmometer (~$300)

Burch and Wartofsky Criteria, Thyroid Storm
(Endocrinol Metab Clin North Am 1993; 22:263)

- Thermoregulatory dysfunction (severity of fever, up to 30 points)
- CNS dysfunction
  - Mild (agitation) – 10 points
  - Moderate (delirium, psychosis, lethargy) – 20 points
  - Severe (seizure, coma) – 30 points
- Heart rate
  - Degree of tachycardia – up to 25 points (HR ≥140)
  - Atrial fibrillation – additional 10 points
- Heart failure
  - Mild – 5 points; Moderate – 10 points; Severe – 15 points
- GI/hepatic dysfunction
  - Moderate (N/V/diarrhea/abdominal pain) – 10 points
  - Severe (unexplained jaundice) – 20 points
- Precipitant history (10 points, if positive)
  > 45 “suggestive”; 25-44 “supportive”; <25 “unlikely”
Thyroid Storm: Treatment

Look for precipitating event
Correct hyperthyroidism
  PTU, methimazole
Block release of preformed thyroid hormone
  SSKI, lithium
Inhibit peripheral conversion of T4 to T3
  PTU, propranolol, glucocorticoids
Decrease circulating hormone directly
  plasmapheresis, charcoal plasma perfusion
Definitive treatment
  radioactive iodine, surgery

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Inpatient Endocrine Pearls: Take Home Points

Goals of presentation:
Definition of an “endocrine emergency”
Sudden change in endocrine hormone that causes instability of pulse, blood pressure, fluid/electrolyte balance, respiration, and/or mentation
Two illustrative case studies
Key “action steps” ✔ for the other endocrine emergencies
Rapidly stabilize the vital that is disturbed
Review overarching principles
Few true emergencies that require immediate intervention
You almost always have time to consult, look up answer

More Reading


Med Clin North Am 1995 (January issue)