

**Project:** Ghana Emergency Medicine Collaborative

**Document Title:** Adrenal Insufficiency/Crisis

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# Objectives

- Diagnosis and Management of Adrenal Insufficiency/Crisis

# Case

- 70yo M with history of stroke leaving him with residual left-sided weakness presented to the ED for altered mental status.
- Family states that this past week, he has been having a cough productive of yellow sputum. He has been having decreased alertness since yesterday. He has been refusing to eat and has been seen sweating.

# Case

- PMH: CVA
- PSH: None
- Meds: None
- All: NKDA
- SH/FH: Lives at home with son and daughter-in-law. No alcohol use/illicit drug use, tobacco use

# Case

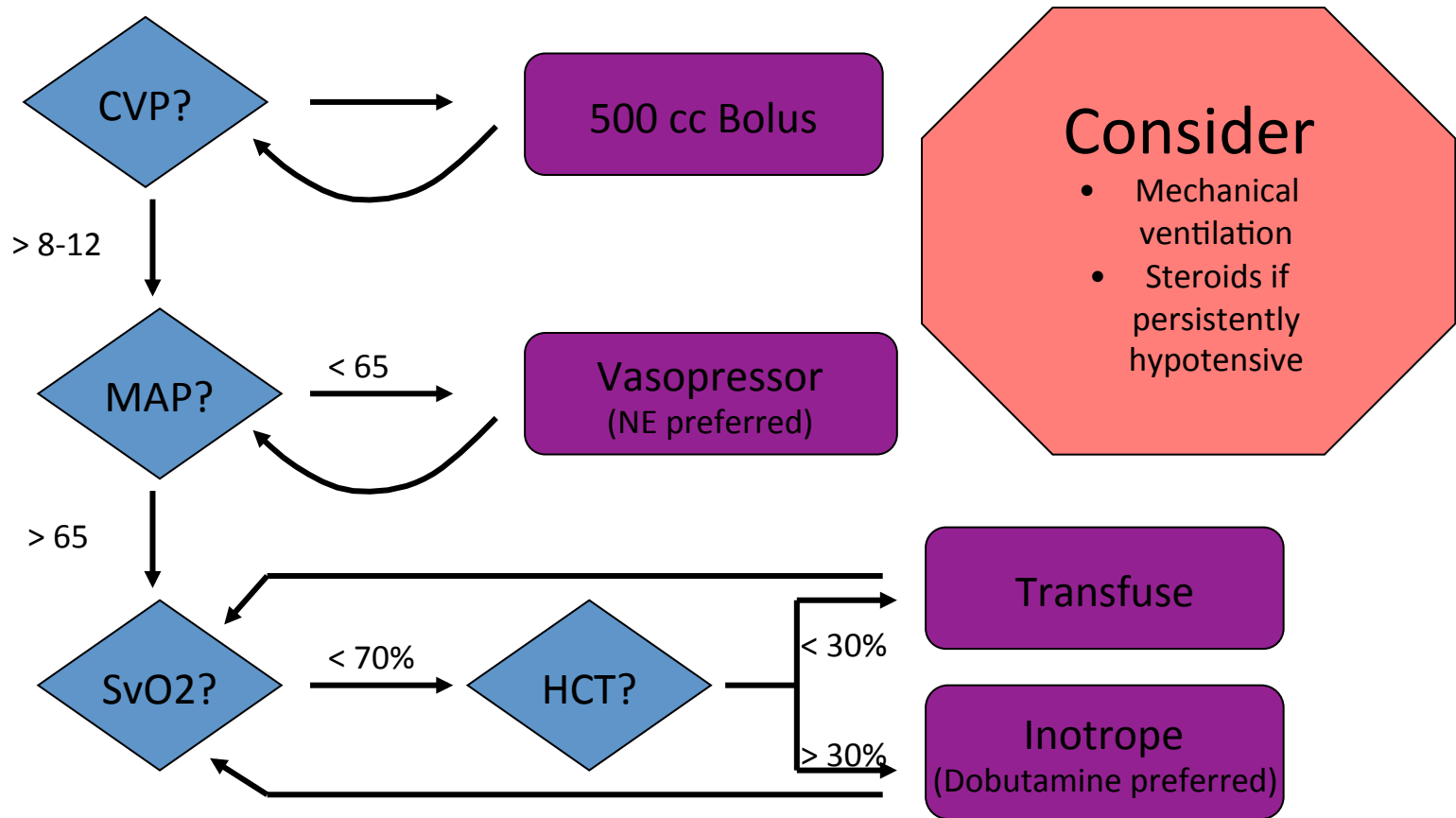
- Physical Exam
  - T 38 BP 72/42 HR 120 RR 10 O2 sat 87% ra
  - Gen: Thin elderly gentleman laying in bed with mouth opened, unresponsive to voice or pain. GCS 3
  - HEENT: MM dry with thick yellow coating on mouth. OP otherwise appears clear with no tonsillar erythema or exudate
  - Neck: soft and supple with no lymphadenopathy
  - Chest: Reduced breath sounds in bilateral bases. Rhonchi heard in the right lung base
  - CV: Tachycardic but regular rhythm, no murmurs, rubs, or gallops
  - GI: Soft, non tender, no masses palpated
  - GU: Uncircumcised penis
  - Extremities: cool to touch, weak pulses felt in the periphery.
  - Skin: No rashes, or decubitus ulcer. + skin tenting.

# Case

- Differential:
- Management

# Case

- SIRS/Sepsis/Severe Sepsis/Septic shock?





# Adrenal Insufficiency

- Background
  - Adrenal gland consists of cortex and medulla
    - Cortex: cortisol, aldosterone and androgens
    - Medulla: catecholamines

# Adrenal Insufficiency

- Pathophysiology
  - Primary failure (aka Addison's disease)
    - Deficiency of cortisol and aldosterone production

## Chronic

Autoimmune adrenitis (Addison's disease)—isolated or polyglandular deficiency, HIV infection (direct involvement or disseminated CMV, MAI, TB, cryptococcosis, histoplasmosis, blastomycosis, toxoplasmosis, *Pneumocystis pneumonia*)

TB and disseminated infections as seen with HIV

Metastatic cancer (breast, lung)

Infiltrative (sarcoid, hemochromatosis, amyloid)

Congenital (adrenal hypoplasia, adrenoleukodystrophy, ACTH resistance)

Bilateral adrenalectomy

Drug toxicity (etomidate, ketoconazole, rifampicin)

## Acute

Adrenal hemorrhage

Meningococemia and other sepsis

Anticoagulation (heparins and warfarin)

Anticardiolipin antibody syndrome

Trauma

# Adrenal Insufficiency

## – Secondary failure

- Due to decreased production of ACTH
- Deficiency of only cortisol production
- Aldosterone is regulated by renin-angiotensin system

### Secondary Adrenal Failure

#### Chronic

Pituitary tumor (primary or metastatic)  
Pituitary surgery or irradiation  
Chronic steroid use with functional deficiency  
Infiltrative (sarcoid, eosinophilic granuloma, TB)  
Traumatic brain injury  
Postpartum pituitary necrosis (Sheehan's syndrome)  
Empty sella syndrome

#### Acute

Pituitary apoplexy (hemorrhage into a pituitary tumor)  
Postpartum pituitary necrosis (Sheehan's syndrome)  
Traumatic brain injury  
Relative **adrenal insufficiency** (sepsis, hepatic failure, severe acute pancreatitis, trauma)

# Adrenal Insufficiency

- Symptoms
  - Chronic failure vague and nonspecific

<b>General</b>	
Weakness, fatigue	100%
Anorexia	100%
Gastrointestinal symptoms	92%
Weight loss	100%
Hyponatremia	90%
Blood pressure $\leq 110/70$ mm Hg	88–94%
Fevers (mild)	Common
Depression, apathy	20–40%
Myalgia, arthralgias	6–13%
Auricular calcifications	5%

# Adrenal Insufficiency

Vitiligo	10%
Hyperkalemia	65%
Hyperchloremia and acidosis	65%
Hypoglycemia	Mild, occasional
<b>Secondary</b>	
Hyperkalemia	Not present
Hyperpigmentation	Not present
Hypoglycemia	More severe, common

# Adrenal Insufficiency

- Acute symptoms
  - Ranges from acute gastroenteritis with nausea, vomiting, fever and dehydration to vascular collapse or death
  - Hypotension or shock out of proportion to severity of illness.
  - Additional symptoms based on etiology:
    - Abdominal pain for adrenal hemorrhage/infarction
    - Headache suggesting acute pituitary apoplexy

# Adrenal Insufficiency

- Differential Diagnosis
  - Chronic
    - Anorexia
    - Carcinoma
    - Chronic fatigue syndrome
    - Polymyalgia rheumatica
    - Myopathy
    - Hypothyroidism
    - Flu syndrome
  - Acute
    - Various causes of shock

# Adrenal Insufficiency

- Diagnostic strategies
  - Chronic
    - AM cortisol measurement (normally 10 and 20 mcg/dL)
      - » If below 3 mcg/dL is diagnostic of hypoadrenalism
      - » If above 20 mcg/dL excludes diagnosis
    - ACTH (cosyntropin) stimulation test confirmatory
      - » Obtain baseline cortisol
      - » Then administer 250mcg of ACTH
      - » Repeat levels at 30-60min
      - » Normal levels should exceed 20mcg/dL
    - AM ACTH level
      - » High level confirms primary
      - » Low level confirms secondary



# Adrenal Insufficiency

- Diagnosis (cont'd)
  - Acute crisis
    - Random cortisol
      - <15 mcg/dL = diagnostic
      - 15-33 mcg/dL = indeterminant
      - >33 mcg/dL = excludes
    - ACTH stimulation test
      - Rise of < 9 mcg/dL diagnostic
  - Hypoadrenalism of Sepsis and Critical Illness
    - Random cortisol <25 mcg/dL = likely
    - ACTH stimulation test <9 mcg/dL = diagnostic

# Adrenal Insufficiency

- Management of acute insufficiency
  - ABCs, 2 large bore IVs place
  - Look for underlying cause
  - Infuse 2-3 L of 0.9% NS
  - Check for hypoglycemia
  - Give Hydrocortisone 50-100mg q6-8 hrs
    - Taper after 24 hours
    - Dexamethasone (0.1 mg/kg)
      - Advantage of not interfering with cortisol measurement

# Sources

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