emDocs

The EM Educator Series

The EM Educator Series: Decompensated Cirrhosis

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Case 1:
A 72-year-old female presents from home with generalized weakness. She is bradycardic and has a temperature of 95F. ECG reveals low voltage.

Case 2:
A 55-year-old female is brought in by EMS with hypotension, bradycardia, and hypoglycemia. They gave her 1 amp D50, but a repeat blood glucose is 50. Her VS include HR 45, BP 88/49, RR 12, O2 sat 87% on RA, T 95F.

Case 3:
A 58-year-old male is brought in by EMS for altered mental status and suspected alcohol intoxication. He is hypoglycemic, slow to respond, and hypothermic. His CT head is normal, and exam reveals no source of infection or other signs of injury.

Questions for Learners:
1. What is the differential diagnosis for altered mental status and unstable vital signs?
2. What are the triggers of decompensated hypothyroidism?
3. What are clinical presentations of decompensated hypothyroidism?
4. What ED diagnostics are helpful with making the diagnosis?
5. What is the ED management, and where can you go wrong?
6. Bonus: Why is my patient not responding to the first-line vasopressor?

Suggested Resources:
- Articles
  - IBCC - Decompensated hypothyroidism
  - REBEL EM - Decompensated hypothyroidism
  - emDocs EM@3AM
  - emDocs EM Primer
  - EPMonthly
  - Life in the Fast Lane
  - WikEM
  - REBEL EM - Non response to vasopressors
- Journal Articles
  - Emerg Med Clinics NA - AMS and endocrine diseases
  - Emerg Med Clinics NA - Hypothyroidism

Answers for Learners:

1. **What is the differential diagnosis for altered mental status and unstable vital signs?**

- Adrenal crisis
- CHF
- CVA
- Tox - Drug overdose
- Hypoglycemia
- Hypothermia / Hyperthermia
- Meningitis
- Sepsis
- Delirium Tremens

2. **What are the triggers of decompensated hypothyroidism?**

- Bradycardia and hypothermia
- Burns
- CHF
- CVA
- Cold exposure
- GI bleed
- Metabolic abnormalities (hypoxia, hypercapnia, hyponatremia, hypoglycemia)
- Medications: Beta blockers, sedatives, opioids, phenothiazines, amiodarone
- Especially medications with CNS depressant effect
- Medication non-adherence (thyroid meds)
- MI
- Sepsis
- Trauma
- PE

3. **What are clinical presentations of decompensated hypothyroidism?**

Hypothyroidism + mental status changes/coma + hypothermia + precipitating stressor

4. **What ED diagnostics are helpful with making the diagnosis?**

<u>Typical Presentation</u>
Decreased mental status but can be subtle

HYPOeverything – hypotension, hypoglycemia, hyponatremia, hypoventilation, *hypocardia*, bradycardia but hypocardia sounded cooler.

- Hypoglycemia – may be caused by hypothyroidism alone or may be due to concurrent adrenal insufficiency due to autoimmune adrenal disease or hypothalamic-pituitary disease.
- Hyponatremia – could be due to impairment in free water excretion due to inappropriate excess vasopressin secretion or impaired renal function or also could be due to adrenal insufficiency.
- Hypoventilation – due primarily to central depression of the ventilatory drive with decreased responsiveness to hypoxia and hypercapnia.
- Hypotension – Decompensated hypothyroidism leads to bradycardia, decreased myocardial contractility, a low cardiac output, and hypotension.

These labs take some time to come back so diagnosis has to be made on clinical suspicion.
- TSH – variable levels. If high then primary hypothyroidism. If low, normal, or slightly high than central hypothyroidism.
- T4 – usually very low
- Cortisol

- Sepsis workup – Remember precipitating event can be infectious so do usual sepsis workup.

5. **What is the ED management, and where can you go wrong?**

- Steroids – 100mg Hydrocortisone IV for suspected adrenal insufficiency
- Thyroid Hormone – Levothyroxine 100-150mcg
- Controversial topic, some experts also recommend adding T3 at 5-20mcg dose. Recommend obtaining Endocrine & ICU consult prior to administering.
- Fluids – Usually hypotensive so start with fluids
- Vasopressors – If volume depletion ruled out, start pressors.
- Remember to treat underlying cause of myxedema!

6. **Bonus: Why is my patient not responding to the first-line vasopressor?**

occult causes of non-response to vasopressors

vital disclaimer: the cognitive response to hypotension should not be reaching for a vasopressor. the primary therapy for hypotension is treatment of the underlying pathology

definition: patients who despite substantial vasopressor doses do not show HD parameter improvements. failure of response → cognitive pause + consideration of reasons

considerations for non-responders

acidosis	dx: blood gas, basic metabolic panel tx: reverse underlying cause, bicarb gtt unlikely helpful, Continuous Veno-Venous Hemodialysis (CVVHD)
hypothyroid	dx: clinical, TSH (may be false neg or delayed) tx: levothyroxine (consider empiric tx)
anaphylaxis	dx: by history. may present as hypotension alone tx: epinephrine, methylene blue, ECMO
adrenal insuff	dx: clinical, depressed cortisol level, hyperK + hypoNa tx: hydrocortisone 100-200 mg (consider empiric tx)
hypoCa^{2+}	dx: ionized Ca^{2+}, prolonged QTc tx: Ca salts (CaCl or CaGluconate)
occult bleeding	occult source: GI, retroperitoneal tx: reverse anticoagulation, transfuse, operative/IR control
toxicologic	occult causes: beta blocker/Ca channel blocker OD, TCA tx: Hyperinsulin Euglycemia Therapy (HIET), ECMO, Bicarb (for TCA)
2nd cause shock	patients can have multiple concurrent causes of shock. look for second cause RUSH protocol extremely useful when considering multiple causes

thanks to @emupdates, @criticalcarenow, @srrezaie