Case 77: Altered Mental Status

- **Chief complaint**
  - 28-year-old male presents with altered mental status
  - EMS Report (if requested): Patient brought from rehab facility, had been there about 24 hours since discharge from your hospital after operative management of a tibial plateau fracture. Staff report he was agitated, combative this morning.

- **Vital signs**
  - **HR: 127** **BP: 179/100** **RR: 25** Sat: 97% on RA **T: 38.2°C** Wt: 80 kg

- **Patient appearance**
  - Patient appears agitated, confused, and diaphoretic.

- **Primary survey**
  - Airway: slurred, mumbled speech
  - Breathing: tachypneic but lungs clear
  - Circulation: warm skin, 2+ distal pulses
  - Disability: PERRL, opens eyes to voice, confused but answering some questions, moves all extremities spontaneously (GCS 13)
  - Exposure: post-op dressings in place on right knee, patient should be placed into a gown for full examination

- **Actions**
  - Place patient on the monitor
  - Two large bore peripheral IV lines (draw rainbow top)
  - 1 L IVF bolus
  - POC glucose (50, must ask)
    - Give Thiamine 100 mg IV
    - Give amp of D50 (improvement in mental status, agitated but with clear speech, repeat glucose 100)
  - Order Stat ECG (delayed interpretation)

- **Instructor Prompt:** discuss differential for altered mental status

- **History**
  - Source: Patient (limited), staff at rehab facility, chart
  - HPI: a 56-year-old male presents with altered mental status. Per review of the chart, the patient presented to your hospital 2 days ago after a ground level fall resulting in a right

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tibial plateau fracture that was managed operatively. He was discharged yesterday to a rehab facility for intensive PT prior to returning home. This morning staff found him agitated and they tried reasoning with him but he became combative. They were able to check a POC glucose which was normal. They noted he was slightly hypertensive last night (170/100) and mildly tachycardic (110) which they attributed to pain. He had a few episodes of vomiting overnight. Notes from hospital stay are unremarkable with a normal post-op course.
    - PMHx: none
    - PSHx: ORIF for R knee tibial plateau fracture (caused by a ground level fall, surgery was 2 days ago)
    - Allergies: none
    - Meds: none
    - Social (per chart): reportedly drinks 2-3 beers daily, no smoking or drugs
    - FHx: non-contributory
    - Code Status: full code (per chart)

- **Physical Exam**
    - **General:** awake and alert, mildly agitated and in moderate distress
    - **HEENT:** dry mucosa, tongue fasciculations present (only if asked)
    - Neck: normal
    - Chest: normal
    - **Heart:** tachycardic
    - **Lungs:** mild tachypnea
    - Abdomen: normal
    - **Extremities:** right knee surgical site clean/dry/intact without erythema or discharge; knee with appropriate post-op swelling and limited ROM
    - **Neuro:** unable to obtain thorough exam due to lack of cooperation but no facial asymmetry, moving extremities symmetrically, speech clear but confused; tremulous
    - **Skin:** diaphoretic, no rash

- **Instructor Prompt:** learners should discuss differential diagnosis based on history and exam

- **Nurse**
    - Patient develops a generalized tonic-clonic seizure

- **Action**
    - Suction prn, consider airway maneuvers such as jaw thrust or nasal trumpet
    - Oxygen via nonrebreather mask
    - Advanced airway and crash cart to the bedside
    - If rechecked, POC glucose is 90
    - Order Seizure Meds
        - Lorazepam IV (will need a total of 4 mg for patient to stop seizing), alternate Diazepam 5-10 mg q5-10 min

- **Reevaluation**
  - If adequate doses are given, the patient will become more alert, then quickly agitated again
  - Repeat vitals: **BP: 153/90** **HR: 110** RR: 14 Sat: 97% on O2

- **Action**
  - Order Labs
    - CBC, BMP, LFT, urinalysis, lactic acid, blood and urine cultures
    - Consider Mg, coagulation studies, ethanol level, urine drug screen, acetaminophen level, salicylate level, TSH, FT4, troponin, CPK, serum osmolality (for osmolar gap), ABG/VBG
  - Order Imaging
    - CT head (noncontrast)
    - Portable CXR
    - Consider X-ray right knee
  - Order Meds
    - 1 L IVF bolus (if not already given)
    - Consider IV antiemetic
    - Consider empiric antibiotics for post-op infection/sepsis
    - Initiate hospital protocol for alcohol withdrawal treatment, typically with symptom-triggered IV benzodiazepine

- **Response/Results**
  - Case 77 Lab Results (sig for **K 2.9, CO2 14, Cr 1.8, AG 16**, **mild elevation in AST>ALT, UA with 2+ ketones**)
  - Additional Lab Results: **Mg 1.0**, EtOH level 0, UTox neg, Aspirin and Tylenol levels negative, **lactate 2.7**, troponin negative (if sent), **CPK 800**, osmolar Gap 9, normal acetone, high beta-hydroxybutyrate
  - ABG: **pH 7.28** pCO2 30 pO2 80 **HCO3 14** (metabolic acidosis with respiratory compensation)
  - ECG (Figure 77.1: sinus tachycardia)
  - CXR (verbal report- within normal limits)
  - XR Knee (verbal report- normal post-op knee)
  - Nurse reports the patient is thrashing and uncooperative, yelling at the nurse

- **Actions**
  - Activate hospital security for support as needed
  - Attempt verbal de-escalation (unsuccessful)
  - Consider physical restraints
  - Give additional IV benzodiazepine (Lorazepam preferred)
  - Repeat dosing if still agitated

- May consider intubation for severe agitation and to facilitate medical care (per instructor discretion and as time allows)
    - Rapid sequence intubation (learner should identify approach, meds and dosages used)
        - Consider benzo or propofol for sedation, rocuronium for paralysis
    - Post-intubation care (learner should provide vent settings, sedation including pain control, post-intubation OGT, CXR, Foley)

- **Response**
    - Patient reevaluation and repeat vitals after multiple doses of IV benzodiazepine (learner will need to give multiple doses to achieve adequate sedation)
        - Vitals after multiple doses of IV benzo: HR: 95 BP: 145/90
        - Vitals if only one dose of IV benzo is given: **HR: 110 BP: 165/98** and patient still agitated (Prompt: give additional doses, intubate as needed)

- **Actions**
    - Order meds
        - Give 100 mg IV thiamine if not already given, multivitamin, folic acid
        - Replete magnesium and potassium
        - Start D5NS infusion
    - Update patient and/or any available family and/or PCP of presumed diagnosis and plan
    - Consult ICU and admit to the ICU (ICU vs step-down unit may be institution dependent if the patient is not intubated)

- **Diagnosis**
    - Primary Diagnosis: Acute alcohol withdrawal (delirium tremens)
    - Secondary Diagnoses: Seizure (due to alcohol withdrawal), hypokalemia, hypomagnesemia, acute kidney injury, alcoholic ketoacidosis

- **Critical actions**
    - POC glucose and dextrose administration
    - Perform appropriate airway management during seizure
    - Provide benzodiazepines for seizure and agitation
    - Head CT for AMS, new seizure
    - Identify and adequately treat alcohol withdrawal
    - Identify and treat alcoholic ketoacidosis
    - Admit patient to monitored bed or ICU

- **Instructor Guide**
    - This is a case of alcohol withdrawal in a patient presenting with altered mental status. Given his post-op state, a broad differential should be considered for his fever, tachycardia, and altered mental status. Obtaining history from the chart of daily alcohol use, consideration of time of onset of symptoms, and thorough physical exam will guide

the learner to the correct diagnosis. The patient is confused and agitated due to his withdrawal, he will continue to become more agitated and abusive to staff until proper medication (benzos) is given. Glucose should be checked early and IV dextrose should be given. Repeated doses of benzodiazepines must be given to reach an adequate level of sedation. Important early actions for any patient with altered mental status include checking blood glucose, obtaining history (including collateral), and a thorough physical exam. Patients with alcohol withdrawal should be admitted to a monitored bed or the ICU depending on their response to treatment and hospital protocol.

- **Case Teaching Points**
    - The differential for altered mental status should include vital sign abnormalities, metabolic/toxicologic causes, infection, primary neurologic disease, and primary psychiatric disease (see details below). This patient has risk factors for multiple causes for altered mental status (recent surgery increases risk for infection, PE, MI; uncontrolled hypertension could lead to hypertensive encephalopathy). Up to 50% of individuals with a history of alcohol use disorders will have symptoms of alcohol withdrawal when they reduce or stop their consumption and 3-5% of those individuals will meet criteria for delirium tremens. Withdrawal delirium usually begins around 3 days after the appearance of general withdrawal symptoms and can last up to a week or more.

- **What is a framework for developing a differential diagnosis for altered mental status?**
    - Vital sign abnormalities
        - Hypoxemia
        - Hypercarbia
        - Hypo/hypertension
        - Tachycardia, bradycardia
    - Metabolic/toxicologic causes
        - Metabolic: hyper/hypothyroidism, hyper/hyponatremia, hyper/hypoglycemia, hepatic encephalopathy, uremia, adrenal failure
        - Toxicologic: any overdose/ingestion, withdrawal syndromes
    - Infectious causes
        - Delirium due to any type of infection
        - Primary CNS infections such as meningitis or encephalitis
    - Primary neurologic causes
        - Intracranial hemorrhage (spontaneous or traumatic)
        - Seizure
        - Intracranial mass
    - Primary psychiatric disease
        - Often a diagnosis of exclusion

- **What are the criteria for alcohol withdrawal?**
    - Cessation or reduction in heavy use of alcohol
    - **And** at least two of eight of the following symptoms

        - Autonomic hyperactivity (eg tachycardia or sweating)
        - Hand tremor
        - Insomnia
        - Nausea or vomiting
        - Transient visual, auditory, or tactile hallucinations or illusions
        - Psychomotor agitation
        - Anxiety
        - Generalized tonic-clonic seizures
    - **And** the symptoms cause significant distress or impairment and cannot be better explained by another disorder

- **What are the stages of alcohol withdrawal?**
    - Alcohol withdrawal syndrome usually develops 6 to 24 hours after the reduction of alcohol intake and can last up to 7 days.
    - Monitoring these patients closely in inpatient units (ICU for moderate or severe disease) is recommended until the signs and symptoms of withdrawal resolve completely.
        - Mild withdrawal (within 24 hr) may involve tremulousness, insomnia, anxiety, hyperreflexia, diaphoresis, GI upset, mild autonomic hyperactivity.
        - Moderate withdrawal (24-36 hr) is characterized by severe anxiety, tremors and excessive adrenergic symptoms.
        - Severe withdrawal / Delirium Tremens (> 48hr) involves profound disorientation, agitation and hallucinations, severe autonomic hyperactivity (tremors, tachycardia, tachypnea, hyperthermia and diaphoresis).
    - Alcoholic hallucinosis (>24 hr) can occur in up to 25% of alcohol dependent patients and involves visual, tactile and auditory hallucinations; hallucinosis is not necessarily followed by DT.
    - Approximately 25% of patients in alcohol withdrawal will develop seizures; 30-50% of these patients will progress to DT.
        - These seizures are usually brief, generalized tonic-clonic, may occur in clusters and usually resolve quickly spontaneously or with benzodiazepines.
        - Status epilepticus is rare and should prompt evaluation for other causes of seizure.

- **What workup is needed for suspected alcohol withdrawal?**
    - Labs including cbc, BMP, LFT, troponin (demand ischemia), CPK (rhabdo from psychomotor agitation), tox panel for co-ingestions
    - EKG (arrhythmia, ischemia)
    - CXR (aspiration pneumonia)
    - Consider CT brain (intracranial hemorrhage, new seizure)

- **What medications can be used for treatment of alcohol withdrawal and withdrawal delirium?**
    - Benzodiazepines are the mainstay of pharmacologic treatment

        - No single drug has definitely been shown to be superior to another but lorazepam (Ativan) is preferred for patients with advanced cirrhosis or acute alcoholic hepatitis due to its long duration of action and safety in patients with hepatic dysfunction (inactive metabolite) as is common in chronic alcoholics.
            - Lorazepam (Ativan) 2-4 mg IV, may double dose every 15-20 min
            - Diazepam (Valium) 5-10 mg IV, increase by 10 mg every 5-10 min
            - Midazolam (Versed) 4-8 mg IV every 5-10 min as needed
        - Total doses needed to control symptoms vary and redosing should consider half-life of medication and patient's response to treatment
    - Alternative medications include:
        - Phenobarbital - may be useful for refractory withdrawal
            - 130-260 mg IV initially, repeat dosing every 15-20 min as needed
                - 65-130 mg as needed for mild symptoms
                - 260 mg as needed for severe symptoms
                - Max 15mg/kg
                - Use lower doses if benzodiazepines have been given.
        - Dexmedetomidine - may be useful to decrease dose of benzodiazepine
        - Propofol - may be useful as benzodiazepine adjuvant in the intubated patient

- **What other supportive care should be considered in treating patients with alcohol withdrawal and alcohol dependence in general?**
    - Intubate for airway protection if needed.
    - Patients with alcohol use disorder are prone to hypoglycemia due to decreased reservoir of glycogen secondary to chronic liver damage. Treatment should include rapid correction of glucose with D50, coadministered with Thiamine (Vitamin B1, 100 mg IV or IM) to avoid precipitation of Wernicke's encephalopathy (abnormal eye movements, ataxia, confusion) or Korsakoff's dementia (irreversible).
    - Even without hypoglycemia, provide thiamine (100 mg daily) and folate (1 mg) daily (these are often deficient in patients with alcohol use disorder)
    - Replete electrolytes as indicated
    - Alcoholic Ketoacidosis is characterized by metabolic acidosis with an elevated anion gap, elevated serum ketone levels, and a normal or low glucose concentration; it is related to extracellular fluid depletion and glycogen depletion. Treatment involves dextrose containing fluids.

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- Image References
    - ECG from NYU ECG Database: https://education.med.nyu.edu/ecg-database/

Case 77 Lab Results

Basic Metabolic Panel:

Na	135 mEq/L
K	2.9 mEq/L
Cl	105 mEq/L
CO_2	14 mEq/L
BUN	21 mg/dL
Cr	1.8 mg/dL
Gluc	70 mg/dL

Liver Function Panel:

AST	190 U/L
ALT	85 U/L
Alk Phos	90 U/L
T bili	1.1 mg/dL
D bili	0.3 mg/dL
Lipase	40 U/L
Albumin	3.2 g/dL

Complete Blood Count:

WBC	10.5 x 10^3/uL
Hb	13.0 g/dL
Hct	38.5%
Plt	185 x 10^3/uL

Coagulation Panel:

PT	13.1 sec
INR	1.0
PTT	28 sec

Urinalysis:

SG	1.018
pH	6.8
Prot	Neg
Gluc	Neg
Ketones	2+
Bili	Neg
Blood	Neg
LE	Neg
Nitrite	Neg
Color	Yellow

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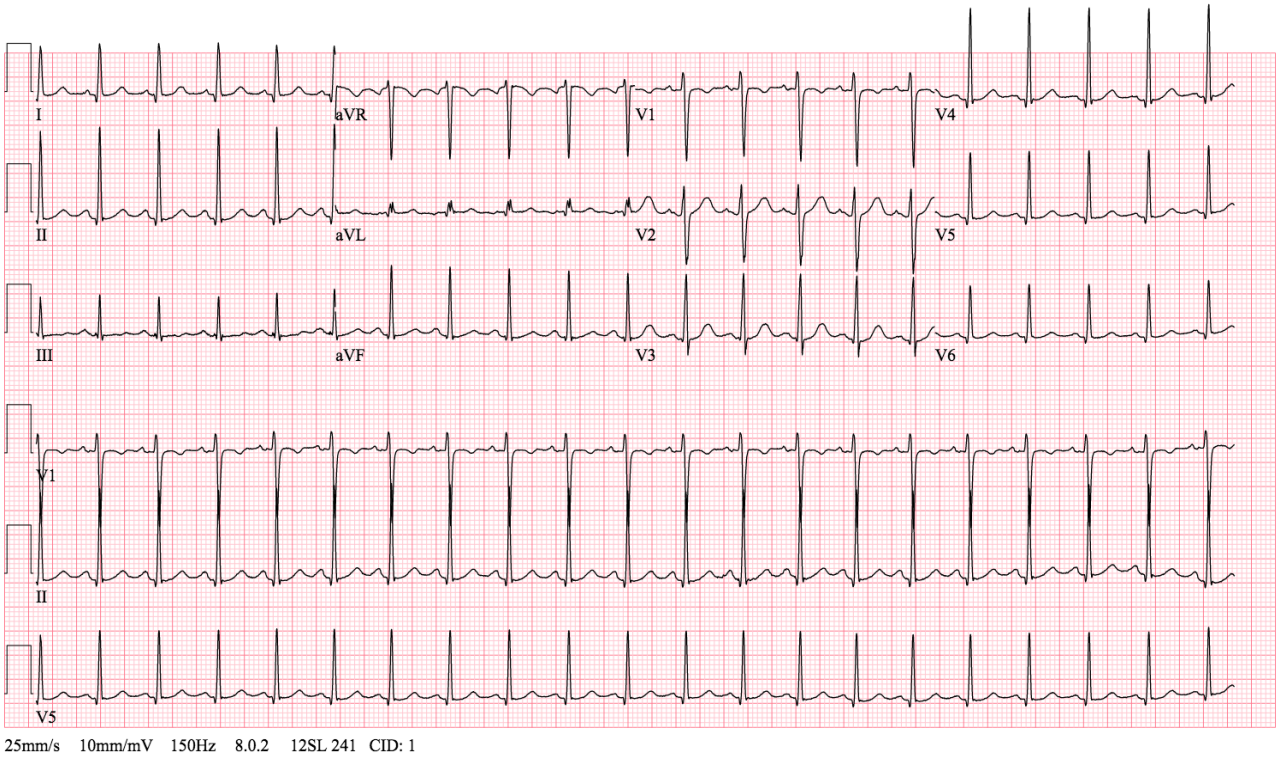
Figure 77.1- ECG



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