Chapter 16 - Depressed consciousness and coma

Episode overview:

1) List a broad differential diagnosis for coma
2) List GCS / Pediatric GCS
3) Describe the oculocephalic and oculovestibular reflex

Wise Cracks:

1) List the common age-related causes of altered mental status
2) What is the initial investigation management of an altered LOC patient?

Rosen’s in Perspective:

Depressed mental status represents an alteration in arousal stemming from a wide spectrum of diseases and presenting on a continuum of impairments. These impairments range from sleepiness, to decreased alertness, to coma. A common approach to this broad differential is DIMS, which is covered later in this episode.

Physiology

Consciousness is the awareness of one’s self or surroundings, and is composed of:

- **Arousal** – *this* is what we refer to as “altered” in altered level of consciousness
  - Dynamic levels on a continuum:
    - Fully alert ↔ Stuporous ↔ Comatose ↔ Complete unconsciousness

- **Cognition** – a *composite* of several factors leading to “states” of consciousness:
  - Orientation – *accurate perception* of what is experienced
  - Judgement – ability to *process* data in order to generate more meaningful info
  - Memory – ability to *store* and *retrieve* information

  - Many medical states can alter cognition (confusion, inattention, delusions, dementia) however, since these states do not depress *level of arousal.*
Pathophysiology

Arousal is controlled by the ascending reticular activating system (ARAS) in the paramedian tegmental zone of the dorsal brainstem
- Determines arousal and cortical activation

Cognition is primarily controlled by the cerebral cortex
- Determines content of consciousness

Therefore anything impacting normal function of the brainstem (small lesion = large deficit) or bilateral cortex can cause depressed consciousness or coma.

The three categories of processes that insult these anatomical areas include:
- Metabolic derangements
- Toxins
- Mechanical injury

1) List a broad differential diagnosis for coma

Break down of table 16-1: using the DIMES approach (“if you don’t think of it you’ll never dx it”)
★ Drugs:
  - The “OB’s 5Cs” as the Critical diagnoses:
    1. Opiates
    2. Beta-blockers
    3. Carbon monoxide
    4. Cyanide
    5. CCBs
    6. Cyclic antidepressants
    7. Cardiac glycosides
  ➢ Abuse: heroin, opiates, benzodiazepines, alcohol, cocaine, amphetamines, marijuana, LSD, mushrooms, GHB
  ➢ Accidental: Carbon Monoxide / Cyanide
  ➢ Acquired: BB, CCBs, digoxin, TCAs, acetaminophen, ASA, SSRI, anticonvulsants

★ Infection
  ○ Meningitis, encephalitis,
  ○ Septic shock and sepsis
Metabolic (by organ system)
- Pancreas:
  - Hypoglycemia
  - DKA, HONK
- Thyroid (hyper or hypothyroid)
- Kidneys (electrolyte derangements, kidney failure with uremic state)
- Liver (hepatic encephalopathy)

Environmental
- High altitude cerebral edema
- Heat stroke
- Hypothermia
- Dysbarism

Structural
- Intracranial Catastrophe
  - ICH, Stroke, Epidural hematoma, Subdural hematoma, SAH
  - Status epilepticus, acute hydrocephalus
- Cardiac
  - ACS, Aortic Dissection
  - Cardiogenic / Hypovolemic / Obstructive / Distributive shock
  - HTN crisis, malignant arrhythmia
Depressed consciousness and coma

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**AEIOU TIPS Approach to Altered LOC**

- **A** ▪ Anaphylaxis or altitude illness or alcohol
- **E** ▪ Epilepsy (pre, intra, or post ictal) or Environmental (hypo/hyperthermia or altitude)
- **I** ▪ Infection
- **O** ▪ Overdose of drugs (insulin, benzos, etc.)
- **U** ▪ Underdose of drugs
- **T** ▪ Trauma (TBI, hemorrhage) / Tumour
- **I** ▪ Insulin
- **P** ▪ Psychogenic / Poisons
- **S** ▪ Stroke / Shock
2) List GCS / Pediatric GCS

Need to know this!
- Glasgow Coma score <8 intubate.
- Remember change >2 points is significant change.
- Recent SMACC talk (Mark Wilson SMACC Chicago) discusses need to describe specifically what E, M and V are. See: http://www.smacc.net.au/2016/03/goodbye-gcs-mark-wilson/

“V”
- Adult and pediatric scoring varies
- “V” for 5 possible scores

“M”
- Most (6) possible scores
3) **Describe the oculocephalic and oculovestibular reflex**

Important tests, as if they give a normal response then a structural lesion in brainstem is unlikely

**Oculo-Cephalic - Doll’s eyes.**
Make sure no contraindications (mainly c-spine precautions)
- Observe eyes with moving head side to side (cervical rotation).
- If eyes remain fixed / frozen in orbits, this is an *abnormal* response
- If eyes maintain forward gaze despite turning the head, this is a positive doll’s eye reflex and is considered the *normal response*

**Oculo-Vestibular - Cold Calorics.**
Ensure no perforated tympanic membranes / Excessive earwax
- Elevate patient's head 30 degrees OR reverse trendelenburg (if c-spine precautions)
- Instill 10-30cc of ice cold water into ear
- Observe eye movements

**REMEMBER COWS - Cold Opposite, Warm Same**
- Referring to direction of nystagmus in relation to water

*Figure 16-2. Oculocephalogenic (caloric) responses to various central nervous system pathologic conditions. MLF; medial longitudinal fasciculus.*

If there is an intact brainstem:
- Instilling cold water into right external auditory canal will result in *slow* conjugate deviation towards to the cold ear for 30-120 seconds, with *fast* nystagmus beats away from the cold ear.

If the **brainstem** is not intact:
- There will be no movement with irrigation.
Wise Cracks

1) List the common age related causes of altered mental status

![Common Age-Related Etiology of Altered Mental Status]

- Infant
  - Infection
  - Trauma, abuse
  - Metabolic
- Child
  - Toxic ingestion
- Adolescent or Young Adult
  - Toxic ingestion
  - Recreational drug use
  - Trauma
- Elderly
  - Medication changes
  - Over-the-counter medications
  - Infection
  - Alterations in living environment
  - Stroke

2) What is the initial management of an ALOC patient:

Step 1: MOBILE (monitors, oxygen, vitals, IV, environment)
Step 2: ABCs
Step 3: Blood Sugar, Temp, ECG
Step 3: Coma Cocktail: Dextrose, Oxygen, Narcan, Thiamine
Step 4: CXR, CT Head, Consider antibiotics +/- antivirals, metabolic antidotes, Trauma management, secondary surveys