Delayed Emergence

Potentially emergent and life-threatening situation which will require both initial supportive care coupled with rapid identification of etiology and definitive treatment.

ANESTHETIC ACTIONS:

Ensure that assessment of vitals, including temperature, and a rapid physical exam are undertaken initially to rule out an immediately life-threatening event prior to further history taking or evaluation

- Monitors in place, good IV access, supportive measures for A, B, Cs…assess D as well with GCS score

1. **LOOK AT THE ANESTHETIC RECORD**
   - Goal is rapid identification of etiology and treatment
     - Stabilization of vital physiologic functions
     - Focused neurological examination
     - Targeted diagnostic tests
     - Institution of specific therapeutic measures
   - May require immediate operative intervention / considerations of increased ICP
2. Differential Diagnosis
   - Drugs: Residual sedation from anesthetic drugs (most frequent), residual NMB
   - Metabolic: Hypoxia/Hypercarbia, Hypoglycemia, Hyper/HypoNa, Hypothermia (especially if temp <33 degrees)
   - Structural: Intracranial pathology (post-ictal, ↑ ICP, ICH, CVA)

PATHOPHYSIOLOGY

- **Even after prolonged surgery and anesthesia, a response to stimulus in 60-90 min should occur**
- Risk factors for prolonged emergence include
  - Severe central nervous system injury (profound retardation, birth anoxia or stroke) or encephalopathy from hepatic failure or infection
  - Intraoperative use of high dose barbiturates for cerebral protection or deep hypothermic circulatory arrest
  - High dose opiod techniques have a unusually protracted course, particularly in the elderly,
- CVA of an embolic, hemorrhagic or ischemic etiology must be ruled out as a possible cause by obtaining serial CT scans
  - Central hypoxic injury may be associated with prolonged desaturation, hypotension or arrest
  - Pre-eclamptic patients—can develop cerebral edema, intracranial hemorrhage or eclampsia (seizures)

HISTORY & PHYSICAL

- Consider type of operation
- Check anesthetic record for drugs, doses, hemodynamic stability, oxygenation etc
- Collateral history (drugs, diabetes, preoperative electrolytes, injuries, infection, endocrinopathy)
- Headache suggestive of SAH or tumor
- Symptoms of increased ICP
- Symptoms of sepsis or meningitis

- Patent airway
- Respirations
  - Cheyne Stokes—cyclic hyperpnea/ apnea, associated with bilateral hemispheric injury, also with CHF
  - Posthyperventilation apnea—awake apnea following moderate decreases in $PaCO_2$, associated with frontal lobe lesions
  - Ataxic (Biot's) breathing—unpredictable sequence of breaths with varied rate and tidal volume, medullary site of lesion
  - Apneustic breathing—repetitive gasps and prolonged pauses at full inspiration
- Full cranial nerve exam with assessment of strength/reflexes in 4 limbs; nuchal rigidity—look for focal neurological signs

INVESTIGATIONS

- **Stat chemstrip**
- ABG will indicate respiratory/acid base issues
- PLT and coags to suggest risk for ICH
- Electrolytes with Ca and Mg
- LFTs and BUN/Cr to evaluate for hepatic or uremic encephalopathy
- Drug and toxicology screens
- CT head/MRI for structural lesions
- Lumbar puncture if meningitis or SAH suspected

DIFFERENTIAL DIAGNOSIS

- **DRUGS**
  - Stimulants
    - TCA
    - Cocaine
    - Amphetamines
  - Sedatives
    - EtOH (& withdrawl)
    - Opiates
    - BDZs
    - Anticonvulsants
  - Residual NMB / pseudocholinesterase deficiency
  - Toxins (ie: heavy metals, chemical ingestion)
- **INFECTION**
  - Sepsis
  - Any infection in elderly pt
  - Meningitis
- **METABOLIC**
  - Electrolytes

        - Glucose (hypo, DKA or HHS)
        - Na+ (hypo & hyper)
        - K+ (hypo & hyper)
        - Ca++ (hyper)
        - Mg++ (hyper)
        - Phos. (hypo)
        - Hypercarbia (> 100 mmHg)
    - Lactic acidosis (profound)
    - Organ failure
        - Renal (uremia)
        - Hepatic (ammonemia)
    - Endocrine
        - Hypothyroid (mxyedema coma)
        - Adrenal insufficiency (1° or 2°)
        - Wernicke's encephalopathy
        - Porphyria
    - Hypothermia (< 33°C)
- **STRUCTURAL**
    - Anoxic brain injury
        - Hypoxia, anemia, CO poisoning
    - Head injury
        - DAI, increased ICP
    - Cerebral edema
    - Seizure and post-ictal state
    - SAH
    - CVA (brainstem)
    - Tumour

TREATMENT

- For residual anesthetic drugs:
    - Narcan 20-40mcg IV q2-3 min increments, consider narcan infusion 0.4mg/hr IV
    - Flumazenil 0.2mg IV q1min to max dose 1mg
    - Physostigmine (does anyone use scopolamine anymore?)
- For intracranial pathology (Duh?) consult your friendly neighborhood neurosurgeon

REFERENCES

- Miller 7th Edition – pg 2723
- Co-existing 5th Edition
- Management of Recovery Room Complications—Anesthesiology Clinics of NA, Dr. Gwirtz
- Prior seminars from Vancouver group