“Tox ACLS”

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Objectives

- discuss the ACLS guidelines for poisoned patients
- list two situations requiring resuscitative “antidotes” list indications for
  - lipid emulsion therapy
  - digoxin-specific antibodies
  - sodium bicarbonate
  - insulin-glucose
- list the mechanisms and therapies for toxic convulsions.
TOX-ACLS: Toxicologic-Oriented Advanced Cardiac Life Support

• 2001 ACLS 1st resuscitation guidelines.

• 2005

• 2010.
How do put all these recommendations together?

Other pearls not addressed in ACLS-guidelines
Important principles

• Goal of resuscitation
  • keep alive until the toxic agent is eliminated from the body.

• Primary cellular toxin
  • special antidote ASAP
Acute intoxication

- Detection and correction of vital functions failures
  - Airway (Intubate)
  - Respiratory (hyperventilate)
  - Cardio-circulatory (fluids then assess the problem)
  - Neurological (seizures)
  - Thermal (external cooling, rewarming)
  - Metabolic (glucose, electrolytes, pH)
Tox Threats to A
Airways- Laryngeal obstruction

- Ingestion of corrosives substances
- Inhalation of toxic substances
  - Intubate early if symptoms

- Coma is a threat to airway protection
  - Intubate to decontaminate or wait for loss of airway protection then decontaminate?
- Neurovitals
Tox Threats to

B
Ventilation - Metabolic acidosis

- Hyperventilation MUST be maintained
- Before, during & after intubation
- Avoid fatal exacerbation of metabolic acidosis
  - cyanide
  - salicylates
  - toxic alcohols
  - metformin
• No role for flumazenil

• Maybe excessive procedural sedation
## Ventilation

| CNS & Respiratory | | |
|------------------|--------------------------|
| **β- blockers**   | Carbon monoxide          |
| **Calcium channel blockers** | Ethanol        |
| **Opiates**       | Methanol                |
| **SSRIs**         | Oral hypoglycemics      |
| **Antipsychotics**| Benzodiazepine/ GHB     |
| **PCP**           | Carbamazepine, valproate, barbiturates |
Tox Threats to C
BRADYCARDIA

• Atropine
• Organophosphates, carbamates, nerve gas
• Doubling doses 2-4 mg
• Digoxin specific antibodies
• Digoxin related bradycardia or arrest
• Chinese herbs with digitalis glycosides
TACHYCARDIA

• can lead to ischemia, high output failure
• 1st Benzodiazepine if sympathomimetic agents
• ? physostigmine for (pure) anticholinergic
  • cautiously to avoid opposite effect
  • cholinergic bradycardia
  • if QRS/QT normal
• Adenosine contraindicated
• CCB contraindicated
• 1st choice benzodiazepine
  • decrease effect of endogenous catecholamine release

• 2nd choices Hydralazine, Phentolamine, nitroprusside (short-acting)

• β-blocker can worsen hypertension (contraindicated)
DRUG-INDUCED ACS

- Cocaine or other sympathomimetics
- Reversal of cocaine-induced vasoconstriction
- 1st, 2nd, 3rd agents benzodiazepine
DRUG-INDUCED VT and VFIB

• Instability and polymorphic VT
  • unsynchronised high energy defibrillation

• Stability
  • lidocaine 1st choice monomorphc VT- effectiveness not demonstrated.

• ANY type 1A or 1C is contraindicated (antagonise Na channel)
  • phenytoin for TCA not recommended
DRUG-INDUCED VT and VFIB

- Torsade de pointes
- Magnesium sulfate even if serum [Mg] is normal
- Overdrive pacing at 100-120 bpm
- Isoproterenol as pharmacological overdrive
DRUG-INDUCED SHOCK

- Hypovolemic shock
  - FLUID CHALLENGE and verify preload
  - Vasopressors

- Distributive shock
  - Vasopressors, ?

- Cardiogenic shock
  - mix of agents. no specific recommendation
Circulation - V fib after HF burn

- Severe hypocalcemia
- Defibrillation alone might not work
- Aggressive calcium repletion
  - 60 ml of calcium gluconate 10% q 2 minutes until ROSC
  - Topical, intravenous, intraarterial
Circulation - Theophylline induced SVT

- Bad prognosis
  - Arrhythmias
  - Hypotension
  - Convulsions
- Only hope is early hemodialysis
- Beta blockers can be useful as a bridge while organizing for dialysis (metoprolol, esmolol)
Circulation - Wide QRS

- Cocaine and other Na channel antagonist:
  - Sodium bicarbonate
  - Sodium bicarbonate
  - Sodium bicarbonate
  - Intralipid
DIGOXIN and other cardiac glycosides

- There are no data to support the use of specific antidotes in digoxin-induced cardiac arrest.

Severe life-threatening toxicity

- \( K > 5.0 \text{ mEq/L} \)

Empiric dosage

- 10 vials for acute ingestion
  - (380 mg)
  - 5 is probably enough
- 5 vials for chronic intoxication
  - 2-3 probably enough
- 5 extra vials extra if no response after 20 minutes.
LOCAL ANESTHETICS

- Lipid emulsion
- Weinberg protocol
- 1.5 mL/kg of 20%
- maximum 8-12mL/kg

- BMV hyperventilation
“Sudden Sniffing Death”

- Beta blockade
- Epinephrine will kill them (again).....
Think differently

- Standard ACLS originally for ISCHEMIC event
- can CPR alone overcome pharmacological toxicity?

- **Aggressive** alkalinization of serum
- digoxin-specific antibodies
- ECMO if available in your centre.
- Hydroxocobalamin +/- thiosulfate
- Lipid emulsion
DRUG-INDUCED CARDIAC ARREST

- Prolonged efforts
- ECMO has been used successfully
Post resuscitation care

• Decontaminate
  • more toxin might be lurking in the GI track

• IV fluids
  • check preload with US IVC filling

• Urinary output

• Serum levels (APAP, ASA, EtOH)

• Dialyse what you can

• Call your Poison Control