EMC 370 Introduction to Medical Emergencies

15 Caustic Agents and Other

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Outcomes

At this lecture's completion, the learner will be able to:

- Integrate pathophysiological principles with the clinical presentations of overdoses of inhaled, absorbed, and ingested toxins. Eg. carbon monoxide, cyanide, organophosphates, caustics, and hydrocarbons.
- Discuss the expected complications of carbon monoxide, cyanide, organophosphates, caustics, and hydrocarbons.
- Discuss the treatment of carbon monoxide, cyanide, organophosphates, caustics, and hydrocarbons.

Page References

- Carbon Monoxide (p. 582-586)
- Cyanide (p. 586)
- Organophosphates (p. 578)
- Caustics (p. 575)
- Plants

Carbon Monoxide

Lethality

- leading cause of non-prescription poisoning deaths in United States
- responsible for an estimated 3000 - 4000 deaths / year

Carbon Monoxide

Clinical features

- CO affects tissues with highest O_2 requirements
  - CNS tissue
  - myocardium

- With mild exposure
  - headache, nausea, vomiting, and malaise predominate
  - physical examination is often unremarkable

Carbon Monoxide

With significant exposure

- S/S include
  - chest pain
  - confusion
  - syncope, and coma
- Physical exam may reveal
  - decreased level of consciousness
  - focal neurologic signs
  - hypotension
  - dysrhythmias

Carbon Monoxide

Therapy

- Scene safety paramount
- ABC's / COMEBIG
  - O_2 at the highest possible concentration is the cornerstone of management
  - 100% O_2 via
    - a tight-fitting face mask with gag reflex
    - ET with no gag reflex

Cyanide

- Sources
  - IV Nitroprusside
  - Burning wool, silk, plastic
  - Certain foods
- Clinical features
  - Cellular toxin (blocks cytochrome oxidase system)
    - CNS – seizure
    - myocardium-arrhythmias
    - metabolic acidosis
  - "bitter almond" odor *
  - NO cyanosis and no low spO_2

Cyanide

Therapy

- ABC's / COMEBIG
  - O_2 at the highest possible concentration
    - ignore the O_2 sat, which may read normal
- Activated charcoal
- A-N-T (p. 587)
  - **A**myl Nitrite - watch for hypotensive effect
  - **N**itrite, sodium
  - **T**hiosulfate 1 amp 50cc IV

Organophosphates

Cholinesterase-inhibiting insecticides

- prevent breakdown of acetylcholine
  - Excess ACh overstimulation or an ACh OD
- Present in both industrial and home settings
- Easily absorbed
  - dermal, conjunctival
  - GI, and pulmonary surface
  - fat-soluble organophosphates
    - accumulate in fat, producing delayed or prolonged symptoms
- symptoms occur minutes to hours post exposure.

Organophosphates

Clinical features

- hyperthermia
- odor of garlic or petroleum on the breath
- SLUDGE BBM / DUMBELS
- Complications
  - NCPE
  - hepatotoxicity

Organophosphates

- Muscarinic features
  - **S**alivation, **L**acrimation, **U**rination, **D**efecation, **G**astrointestinal cramping, **E**mesis, **B**ronchospasm, Bronchorrhea, sweating, and **M**iosis
- CNS features
  - Restlessness, agitation, headache, drowsiness, confusion, ataxia, delirium, seizures, and coma

Organophosphates

Therapy

- Initial stabilization, airway management
  - endotracheal intubation, mechanical ventilation, vigorous suctioning, and the administration of supplemental oxygen as necessary
- Cardiovascular resuscitation and treatment of ventricular arrhythmias
- Seizures are treated with benzodiazepenes.
- Antidote: Atropine
  - blocks acetylcholine at muscarinic receptors, but does not reverse nicotinic

Organophosphates

Atropine

- 0.5 mg/kg
- up to 4 mg IV q 5 - 15 minutes
- until adequately atropinized
  - until secretions are drying
  - Skin: dry and flushed
  - pupils: dilated
  - HR: rapid
- ≤ 12 yo: 0.05 mg/kg slow IV push
  followed by 0.02 - 0.05 mg/kg every 5 - 15 min

Organophosphates

- Decontamination
  - Gastric lavage indicated if patient presents early after ingestion
  - activated charcoal should be administered
- Dermal decontamination.
  - Contaminated clothing should be removed and placed in plastic bags for disposal.
  - Skin, hair, and nails should be washed with soap and water, and conjunctivae should be irrigated.

Caustic Ingestions

Corrosive injury (p. 575)

- Acids
  - foul taste
  - causes a coagulation, which somewhat limits penetration
- Alkalis
  - tasteless / odorless
  - cause a liquefaction
    - extensive penetration / full thickness

Caustic Ingestions

Therapy for caustic ingestions

- Initial. ACLS protocols applied as warranted
  - Maintain airway / prevent aspiration.
  - 2 large bore IV lines should be established
    - Hypotension treated with an isotonic solution (Normal Saline)
- do *NOT* attempt to neutralize
- do *NOT* attempt to place NG tube

Caustic Ingestions

Decontamination contraindications

- Contraindicated
  - emetics
  - neutralizing agents
- Relatively contraindicated
  - gastric lavage
  - activated charcoal

Toxic Plants

Toxic Plant	Type of toxin
• Azalea	Nicotine-like and cardiotoxic
• Foxglove	Cardiac glycoside
• Jimsonweed	Anticholinergic
• Mistletoe	Tyramine
• Mountain laurel	Nicotine-like
• Oleander	Cardiac glycoside
• Pits (of cherry, apricot, and peach)	Cyanide-like

Hydrocarbons

- Exposure
  - accidental
    - inhalation
  - intentional
    - huffing, sniffing
  - toddler or mentally ill
    - ingestion
- Pathophysiology
  - heart
  - lung
  - brain

Hydrocarbons

Toxicity depends on chemical composition (FYI)

- Lungs
  - most common organ injured
  - worse with Butane (high volatility)(p.573)
- Cardiovascular
  - arrhythmias
  - blocks, pump failure
- CNS
  - drowsiness, confusion, ataxia, delirium, coma, and seizures

Hydrocarbons

Therapy

- Initial ACLS protocols applied as warranted
  - Maintain airway / prevent aspiration
    - ET for resp. failure (5/6) (p.574)
  - Decontamination contraindications
    - contraindicated
      - emetics
      - diluting agents
    - relatively contraindicated
      - gastric lavage (CHAMP) (p.574)
      - activated charcoal

Summary

We have discussed:

- Pathophysiology, clinical presentation, expected complications, and treatment of ODs with inhaled, absorbed, and ingested toxins.
- CO, cyanide, organophosphates, caustics, and hydrocarbons.