

Chapter 13
Poisonings, Overdoses, and Intoxications

- Learning Objectives**
- Discuss use of activated charcoal in treatment of poisonings
 - List treatment options for acetaminophen overdose
 - List clinical manifestations of cyclic antidepressant overdose

- Learning Objectives**
- Discuss medications used in treatment of cyclic antidepressant overdose:
 - Sodium bicarbonate
 - Magnesium sulfate
 - Phenylephrine (Neo-Synephrine)
 - Norepinephrine (Levophed)
 - Diazepam (Valium)
 - Phenytoin (Dilantin)

Learning Objectives

- Discuss medications used in treatment of beta blocker overdose:
 - Atropine sulfate
 - Glucagon
- Discuss use of benzodiazepines and haloperidol (Haldol) in the treatment of amphetamine and methamphetamine intoxication

Learning Objectives

- Discuss medications used in treatment of cocaine intoxication:
 - Benzodiazepines
 - Nitroglycerin (Nitrolingual, NitroQuick, Nitro-Dur)
 - Aspirin
 - Morphine sulfate
 - Phentolamine (Regitine)

Learning Objectives

- Discuss use of naloxone (Narcan) in treatment of narcotic overdose
- Discuss medications used in treatment of organophosphate and nerve agent exposure:
 - Atropine sulfate
 - Pralidoxime (2-PAM)

Introduction

- Only a few drugs and chemicals are responsible for 90% of all intoxications
- Poisonings are usually result of a psychiatric disorder or recreational drug use
- Patients with toxin exposure are victims of biologic or chemical terrorism

Syrup of Ipecac and Activated Charcoal

- Initial priorities
 - Airway patency
 - Adequate ventilation
 - Sufficient perfusion of blood to critical organs

Syrup of Ipecac and Activated Charcoal

- Prevent or reduce absorption of toxin
 - Can require removal of particulate matter in the case of skin absorption
 - Removal of patient to a safe environment with presence of toxic fumes
 - Possible administration of activated charcoal for ingested poisons

Syrup of Ipecac and Activated Charcoal

- Ipecac
 - Induces vomiting in 90% of patients within 10 to 20 min
 - Research shows no improved benefits of ipecac administration
 - Contraindicated for caustic substances
 - American Academy of Pediatrics recommends that ipecac no longer be administered

Syrup of Ipecac and Activated Charcoal

- Activated charcoal
 - Reduces absorption of ingested poison by providing a large surface area to which ingested poison can bind
 - 1-g dose of activated charcoal provides 300 to 2000 m² of surface area to which toxin can adhere, limiting absorption
 - Causes nausea and vomiting

Syrup of Ipecac and Activated Charcoal

- Activated charcoal
 - Evaluate patient's level of consciousness and ability to cooperate with therapy
 - Not recommended in all ingestions:
 - Iron
 - Lithium
 - Alcohols
 - Ethylene glycol
 - Organophosphates
 - Acids and bases
 - Cyanide

Acetaminophen Overdose

- One of most commonly used in intentional overdoses
- Presentation:
 - Abdominal pain
 - Nausea
 - Vomiting

Acetaminophen Overdose

- Management
 - Prehospital care is only supportive
 - Monitor airway
 - Supplemental O₂
 - IV line should be placed, and IV infusion started
 - Hypotension treated with bolus of dextrose-free IV fluids
 - If patient requires emergency phenytoin, an IV line containing dextrose results in precipitation of phenytoin

Cyclic Antidepressant Overdose

- Clinical manifestations:
 - Depressed level of consciousness
 - Wide-complex cardiac arrhythmias
 - Hypotension
 - Seizures

Cyclic Antidepressant Overdose

- Management
 - Administer activated charcoal if no contraindications exist
 - Cardiac arrhythmias can occur
 - Widening of QRS complex to more than 100 ms and progression to frank ventricular tachycardia is likely to occur after ingestion
 - If patient has wide-complex QRS rhythm, treat with sodium bicarbonate
 - If cardiac rhythm torsades de pointes, use magnesium sulfate

Cyclic Antidepressant Overdose

- Management
 - Patients who have overdosed on cyclic antidepressants and have hypotension that does not respond to aggressive administration of IV fluids:
 - Phenylephrine
 - Norepinephrine
 - Seizures can precede ventricular tachycardia
 - Diazepam (Valium) or other benzodiazepine
 - Phenytoin (Dilantin)

Beta Blocker Overdose

- Signs:
 - Bradycardia
 - Heart block
 - Hypotension
 - Delirium
 - Seizures
 - Coma

Beta Blocker Overdose

- Management
 - Bradycardia
 - Atropine and IV fluids
 - If atropine increases heart rate, effect is often brief, and bradycardia will recur
 - Must improve perfusion

Beta Blocker Overdose

- Management
 - Glucagon is beta blocker overdose antidote
 - Success is variable
 - Increases concentration of an energy-storing chemical inside cells known as cyclic adenosine monophosphate (cAMP)
 - Increased concentration of cAMP results in heart beating stronger and faster

Amphetamine and Methamphetamine Intoxication

- Increases body's levels of circulating epinephrine and norepinephrine
 - Fight-or-flight hormones
 - Responsible for:
 - Tachycardia
 - Hypertension
 - Hyperthermia
 - Agitation
 - Mydriasis

Amphetamine and Methamphetamine Intoxication

- Increases body's levels of circulating epinephrine and norepinephrine
 - Super-normal levels of catecholamines can also cause:
 - Myocardial ischemia
 - Cardiac arrhythmia
 - Seizure
 - Stroke
 - Intracranial hemorrhage
 - Death

Amphetamine and Methamphetamine Intoxication

- Management
 - Gastric lavage or activated charcoal does not help
 - Benzodiazepines can control agitation
 - Binds with benzodiazepine receptor
 - GABA binds to same receptors
 - Haloperidol can be used on patients who do not respond to benzodiazepine therapy
 - Potent antipsychotic agent used to treat agitation
 - Has low incidence of sedation and hypotension

Cocaine Intoxication

- Management
 - Clinical findings:
 - Tachycardia
 - Hypertension
 - Dilated pupils
 - Hyperthermia
 - Agitation

Cocaine Intoxication

- Management
 - Use benzodiazepines for agitation
 - Diazepam (Valium)
 - Midazolam (Versed)
 - Lorazepam (Ativan)
 - Haloperidol (Haldol) is second-line drug for patients who do not respond to benzodiazepines or who are psychotic

Cocaine Intoxication

- Management
 - Cocaine can produce serious cardiovascular complications:
 - Tachycardia
 - Hypertension
 - Chest pain
 - Myocardial ischemia

Cocaine Intoxication

- Management
 - Chest pain
 - Ischemic in nature
 - Use nitroglycerin
 - Aspirin should be considered
 - Reduces effectiveness of platelets to form clots
 - Clots occlude flow of blood vessels in the heart
 - Heart does not receive critical amount of O₂
 - Inhibits the enzyme cyclooxygenase and impairs platelet function for life of the platelet (7 days)

Cocaine Intoxication

- Management
 - Chest pain
 - If chest pain persists after benzodiazepines, nitroglycerin, and aspirin:
 - Consider morphine
 - Phentolamine (Regitine) can also be used

Cocaine Intoxication

- Management
 - Hypertension from cocaine should not be treated with beta blockers
 - Can exacerbate coronary artery vasoconstriction
 - Increased chance of death
 - Seizures
 - Administer benzodiazepine followed by loading dose of phenytoin

Overview of Narcotic Overdose

- Heroin is common because the quantity in any given sample can vary greatly
 - More soluble in fat
 - Allows drug to reach higher levels in the system more rapidly
 - Presentation
 - Depressed level of consciousness
 - Hypotension
 - Respiratory depression
 - Rule out common metabolic conditions

Overview of Narcotic Overdose

- Management
 - Administer coma cocktail
 - Mixture of thiamine, dextrose, and naloxone
 - Hypoglycemia is treated with dextrose
 - Administer 50% dextrose
 - 50 g of IV dextrose
 - Administer thiamine before dextrose to prevent Wernicke-Korsakoff syndrome
 - In absence of hypoglycemia, do not administer dextrose
 - Naloxone (Narcan) binds to opiate receptor to prevent altered mental status, hypotension, and respiratory depression

Overview of Narcotic Overdose

- Management
 - Naloxone (Narcan) binds to opiate receptor to prevent altered mental status, hypotension, and respiratory depression

Organophosphate and Nerve Agent Exposure

- Organophosphates are found in insecticides and fertilizers
 - Chemicals were altered for use as nerve agents
- Sarin and VX
 - Routes include inhalation, ingestion, and skin absorption
- Phosphates are highly explosive

Organophosphate and Nerve Agent Exposure

- Poison body by inhibiting the enzyme acetylcholinesterase
 - Acetylcholinesterase breaks down and deactivates the neurotransmitter acetylcholine
 - Without acetylcholinesterase present to break it down, acetylcholine builds up and causes overstimulation of the parasympathetic nervous system
 - Results in both muscarinic and nicotinic effects

Organophosphate and Nerve Agent Exposure

- Management
 - Symptoms can occur within 5 min of exposure
 - Manifestations:
 - Excessive respiratory secretions
 - Bronchospasm
 - Respiratory insufficiency

Organophosphate and Nerve Agent Exposure

- Management
 - Must secure airway
 - If intubation is performed, succinylcholine (Anectine) should not be used
 - Cannot be broken down, and can result in prolonged paralysis
 - Use atropine
 - Reverses effects of muscarinic receptors
 - Use pralidoxime for nicotinic effects


