



Organophosphate Poisoning

Patricia Rodriguez, MD
PGY-1

Organophosphates

Commonly used as insecticides (ex. parathion and malathion)

Organophosphates are acetylcholinesterase inhibitors

- Acetylcholinesterase is an enzyme which breaks down acetylcholine into acetic acid and choline

This causes an overall increase in the amount of acetylcholine at the synaptic cleft

Acetylcholine

A neurotransmitter in both the peripheral and central nervous systems and plays an important role in the autonomic nervous system

It is released from pre- and post-ganglionic parasympathetic neurons and pre-ganglionic sympathetic neurons

It binds to two kinds of receptors:

- Muscarinic receptors
- Nicotinic receptors

Our Patient

A six year old male with no significant past medical history comes to the Emergency Room via EMS after he began having difficulty breathing while in his father's barn in Homestead. In the ER, you note that he is in mild respiratory distress, has increased secretions from his mouth, pupils are 3mm in size, and he is diaphoretic and mildly bradycardic.

A Few Minutes Later...

After removing all contaminated clothing, the patient begins to exhibit worsening respiratory distress and diarrhea. What is the next best step in management?

- A. Provide 100% oxygen via facemask
- B. Endotracheally intubate the patient
- C. Obtain a chest X-Ray to rule out a cardio-pulmonary process for the increased respiratory distress
- D. Insert peripheral IV and obtain labs

B. Intubate the Patient

Patients in moderate to severe organophosphate poisoning will require 100% oxygen and immediate intubation

Patients with mild poisoning will rapidly develop respiratory failure secondary to bronchospasms, diaphragmatic weakness, and central nervous center depression

Rapid Sequence Intubation (RSI)

Administration of sedative and neuromuscular blocking agents in order to intubate a patient in the ER

Succinylcholine has been reported to cause bradycardia and asystole in pediatric patients

- Must be used with atropine in children less than one year of age

Avoid the use of succinylcholine in organophosphate poisoned patients

- It is normally metabolized by acetylcholinesterase leading to prolonged neuromuscular blockade

Back to Our Patient

The boy has been intubated in the ER and is being ventilated manually. He continues to have bradycardia, diaphoresis, and increased oral secretions which require frequent suctioning.



What is the most appropriate dose of atropine to give the patient?

- A. 1mg/kg IM
- B. 2-5 mg IV
- C. 0.05 mg/kg IV
- D. 1 mg/kg IV

C. 0.05 mg/kg IV

Atropine is an anticholinergic drug which acts as a competitive antagonist for the muscarinic acetylcholine receptor

Adult dosing: 2-5 mg IV

Pediatric dosing: 0.05 mg/kg IV

In both patient populations, you can double the dose every 5 minutes until symptoms are diminished

- Decreased salivation, diaphoresis, and bronchospasms
- Do not rely on tachycardia or mydriasis

Atropen

An atropine autoinjector

Used by people outside of the hospital setting who are trained to recognize pesticide or nerve agent intoxication

Dosing is based on weight:

- 7-18 kg: 0.5 mg
- 19-41 kg: 1 mg
- >41 kg: 2 mg

Pralidoxime

A cholinesterase reactivating agent

Binds to both muscarinic and nicotinic receptors therefore treating the neuromuscular dysfunction atropine does not

May not be used as single agent in the treatment of organophosphate poisoning

- Can worsen symptoms secondary to temporary oxime-induced acetylcholinesterase inhibition

Thank You

REFERENCES

- Up to Date
 - Organophosphate and Carbamate Poisoning (Bird; Nov, 2006)
 - Rapid Sequence Intubation in Adults (Bair; Jan, 2010)
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- Le, T. et al. First Aid for the USMLE STEP 1. 2006. Pharmacology, pg 198-202.