Use of Physostigmine in Toxicology

Physostigmine is a cholinesterase inhibitor which is used in the diagnosis, and sometimes treatment, of anticholinergic poisoning. Physostigmine has a short half-life, and anticholinergic symptoms often return once the physostigmine has been metabolized. Depending upon how much anticholinergic the person has been exposed to, the effects of physostigmine may last as little as 15 minutes. Therefore, physostigmine is frequently used only as a diagnostic tool.

Another reason why the use of physostigmine in poisonings and overdoses is uncommon is because of the adverse effects and deaths associated with its use. Physostigmine should NEVER be given in the presence of a tricyclic antidepressant (TCA) ingestion. Seizures, ventricular dysrhythmias, and asystole have been reported following physostigmine administration in persons with a TCA overdose. Other situations in which physostigmine should not be used include: (a) patients with exposures to other sodium channel blocking agents (e.g. diphenhydramine) and (b) any patient with a cardiac conduction disturbance. Rapid administration of physostigmine can lead to seizures and/or cardiac dysrhythmias, including asystole. Other adverse effects include cholinergic symptoms such as nausea, vomiting, diarrhea, diaphoresis, increased bronchial or salivary secretions, bradycardia, muscle weakness and hypotension. Airway obstruction can result from excess secretions.

Physostigmine should only be used after consultation with a toxicologist. The patient must have IV access and continuous cardiac monitoring prior to and during physostigmine administration. Atropine should be at the bedside in case the patient develops excessive cholinergic symptoms.

Physostigmine can be a useful diagnostic tool in persons exposed to pure anticholinergic agents, such as atropine or scopolamine, which do not affect cardiac conduction. It may also be efficacious in treating these pure anticholinergic exposures. However, its use has become limited due to the risk of severe side effects including seizures, arrhythmias and death. Fortunately most anticholinergic exposures can be managed with symptomatic and supportive care.

For questions regarding the use of physostigmine, please call Iowa Statewide Poison Control Center at 1-800-222-1222.

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