Communication

Ocular Scopolamine-Induced Psychosis

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Anticholinergic agents such as atropine and scopolamine have long been known to produce central nervous system and systemic symptoms when administered in excessive doses. A psychotic-like reaction characterized by hallucinations, confusion, restlessness, and agitation may be seen. Other signs of anticholinergic toxicity, including tachycardia, flushing, hot dry skin, dry mucous membranes, urinary retention, and constipation, may also be present. While clinicians are generally aware of the dangers of oral anticholinergic agents, the potential toxicity of ophthalmic medications may be overlooked. The following case describes both the psychiatric and systemic manifestations of an overdose of scopolamine hydrobromide 1 percent ophthalmic solution.

Case Report

Mr. A., a 25-year-old married white man, presented to the emergency room with agitation and visual, auditory, and tactile hallucinations (seeing red and blue flashing lights and ghostly human-like images, hearing his name called, and feeling insects crawling on his skin). He made poor eye contact and appeared anxious. Upon questioning, he described feeling hot and flushed and having dry mouth and eyes. The day prior to the development of these symptoms, he had been involved in a fist fight and sustained a blow to his right eye, which produced pain, swelling, and a tear in the lacrimal duct. He was given prescriptions for scopolamine hydrobromide 1 percent ophthalmic solution (1 drop in the right eye four times a day), prednisolone acetate 1 percent ophthalmic solution (1 drop in the right eye four times a day), erythromycin ophthalmic ointment, and an oral antibiotic. The patient believed that the scopolamine was simply an eye wash solution and placed 2 to 5 drops in both eyes eight to ten times over the next 12 hours "to get the red out." When the psychotic symptoms developed, he was brought to the emergency room by his family and was subsequently admitted to the Medicine Service.

Mr. A. denied recent use of alcohol, marijuana, cocaine, or other illicit drugs. Blood alcohol concentration on admission was 0 mg/dL; urine toxicology screen revealed only nicotine, its metabolites, and caffeine. The assay does not detect scopolamine. All other laboratory data were within normal limits. The only medications the patient was taking were those prescribed for his eye injury. Upon admission the scopolamine was discontinued; prednisolone was continued in the same dose. Haloperidol, 5 mg intramuscularly, was ordered on an as-needed basis; however, the patient did not receive any doses.

The Psychiatry Consultation-Liaison Service was asked to evaluate the psychotic presentation of the patient to rule out an underlying functional disorder. He was seen approximately 24 hours after the scopolamine was discontinued. Mental status examination revealed an alert, oriented, cooperative young man with appropriate mood and affect. His speech was clear, coherent, and relevant; his memory was intact. There was no evidence of an underlying thought disorder, and he was considered to have an organic hallucinosis secondary to scopolamine overdose. Prednisolone was ruled out as the etiological agent, since the psychotic symptoms abated while prednisolone was continued. The blow to his eye was consid-

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ered insufficient to produce head trauma leading to central nervous system symptoms. He was discharged from the hospital after a stay of two and one-half days.

Comment

Few reports of toxic manifestations following ocular administration of scopolamine or atropine have appeared in the literature.[1-3] A small amount of the ophthalmic solution may be absorbed directly through the conjunctiva, but these solutions also drain through the tear ducts to the nasal mucosa and then to the gastrointestinal tract; systemic absorption may readily occur by means of this route.[4] Since 1 drop of a 1 percent solution contains approximately 0.67 mg of active drug (assuming 15 drops per milliliter), this patient received between 10.72 and 33.5 mg of scopolamine over the 12-hour period. The toxic oral dose has been reported to be 5 to 10 mg.[5] The recommended dose of scopolamine ophthalmic solution is 1 to 2 drops up to three times daily. Psychotic behavior has also resulted from use of the transdermal form of scopolamine, once thought to produce few systemic side effects.[6] These case studies point out the need to be aware that extraorally administered anticholinergic medications have the same potential to produce serious adverse reactions as oral agents.

Differentiation must be made between an anticholinergic psychosis and a functional disorder such as schizophrenia or mania. In most cases, the acute onset of psychological symptoms, the accompanying physical signs, and the resolution of symptoms over 24 to 48 hours indicate an anticholinergic psychosis. When the diagnosis is in question, however, parenteral physostigmine salicylate can be used as a diagnostic test. Physostigmine, an acetylcholinesterase inhibitor, crosses the blood-brain barrier to counteract both central and peripheral effects of anticholinergic toxicity. The adult dose is 1 to 2 mg administered intramuscularly or by slow intravenous infusion. One half of this dose is used in children or the elderly. A positive response, consisting of slowing of the heart rate, decreased temperature, and improvement in men-

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tal status, indicates anticholinergic excess rather than a functional disorder. If a positive response does not occur within 15 to 20 minutes, the dosage regimen is repeated until a total of 4 mg (2 mg in children and the elderly) has been given, or symptoms of cholinergic toxicity appear. These include bradycardia, diaphoresis, rhinorrhea, salivation, and lacrimation.[7] Since the effects of parenteral physostigmine last only one to two hours, the drug is more suitable as a diagnostic agent or emergency antidote than as a definitive treatment of an anticholinergic psychosis. The primary focus of treatment is close supervision of the patient, minimal sensory stimulation, and frequent reassurance and reorientation.

This case also illustrates the need for effective patient education for ophthalmic products. Many patients do not understand that prescription products differ from over-the-counter preparations designed for symptomatic relief of red, tired eyes. Instruction provided by either the physician or the pharmacist, stressing the need to comply with the specified dose, may be helpful in preventing adverse reactions of the type described in this report.

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