Acute psychosis induced by topical cyclopentolate eye drops in a young child

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Abstract

Cyclopentolate is an anticholinergic drug, which is used as a cycloplegic in eye examinations for mydriasis.Though rare, if absorbed systematically, it is known to cause central anticholinergic syndrome. Children are especially prone to this due to their lower body weight. Central anticholinergic syndrome (CAS) is a clinical entity which shows central and peripheral effects produced by over dosage or abnormal reaction to clinical dosage of anticholinergic drugs. Anxiety, seizures, tachycardia, hyperpyrexia, mydriasis, vasodilatation, gastric and urinary retention can be observed during CAS. We may also see behavioral changes and transient psychotic reactions. Here we are reporting a case of a 7- year- old female child who after instillation of cyclopentolate eye drops developed psychosis. The Child was kept under observation for about 24 hours and her symptoms remitted spontaneously.

Keywords: Psychosis, Cyclopentolate, Central anticholinergic syndrome.

Introduction

Central anticholinergic syndrome (CAS) was first described by Longo in 1966.[1] The estimated frequency of this syndrome varies between 1 and 11.2%.[2] Systemic absorption of the drug, following eye drop instillation, can occur transconjunctivally or via the nasolacrimal duct through the highly vascular nasal mucosa.CAS results from the inhibition of muscarinic cholinergic neurotransmission and is manifested either as the effects of central nervous system (CNS) or the peripheral nervous system. These include tachycardia, restlessness, psychosis, hyperactivity, seizures, incoherent speech, and ataxia.[3-6] Children are especially prone to cyclopentolate toxicity due to their lower body weight.[6] Various manifestations in children include flushing, tachycardia, feeding intolerance, seizures, and drowsiness. Behavioral changes and transient psychotic reactions may also occur.[5-8]

Case Report

We are reporting a case of a 7-year- old school going female child, who visited the ophthalmology department at our hospital with complaints of diminished vision since the past 6 months. She had no history of any allergy, systemic illnesses or prior history of drug intake. She was being investigated for refractive errors and hence 1% cyclopentolate eye drops was chosen to dilate her pupils. She was instilled with 3 drops in both the eyes initially and her father was further instructed to instill the drops every 15 minutes for the next one hour. Therefore, a total of 12 drops were instilled by the end of one hour. After a period of one hour the family members noticed altered behavior in her in the form of inappropriate laughing, disinhibited behavior, restlessness and easy irritability. The child was then referred to the psychiatry outpatient department by the concerned ophthalmologist. In the psychiatry outpatient department, on observation, it was noticed that the child was emotionally labile and had irrelevant speech. She was constantly smacking her lips and showed hallucinatory behavior as if talking to someone who was not present there. On examination, her pupils were fixed and widely dilated. Rest of the general physical examination was unremarkable. Mental status examination revealed the child to be conscious, oriented and well aware of her surroundings. She was restless, easily startled, eye to eye contact was not established and rapport was established with difficulty. She also had increased psychomotor activity. Her attention could be aroused but concentration ill sustained. Since the history suggested strong evidence between the administration of Cyclopentolate eye drops and the development of acute symptoms, a diagnosis of Cyclopentolate induced psychosis was made. The child was kept under observation, her family members were reassured and no pharmacological intervention was done. Her symptoms gradually resolved within the next 8-10 hours and she was discharged after 24 hours of observation.

Discussion

Acetylcholine and acetylcholine receptors are widely distributed in the brain. Acetylcholine is important in regulating many functions including the sleep-wake cycle, memory, alertness, orientation, and analgesia. An absolute or relative reduction in cholinergic activity in the CNS can result in an anticholinergic syndrome. Because of the ubiquitous presence and diverse functions of acetylcholine in the CNS, anticholinergic syndrome can manifest with a variety of signs and symptoms.[9] These include dryness of skin and mouth, dermal flushing, urinary retention, irritability, abdominal distension, CNS excitation and depression in the form of psychosis, hallucinations, convulsions, disorientation, hyperpyrexia, hyperanalgesia, ataxia

and cognitive impairment. It may also result in sedation and coma.[6]

Cyclopentolate is an anticholinergic, antimuscarinic tertiary amine with atropine-like actions. When instilled topically in the eye, it is well absorbed, both into the eye and systemically. It is the first choice especially in children over the age of 1 year as it allows successful cycloplegic refractions with few complications.[5,6] Systemic absorption occurs through the conjunctiva, the nasolacrimal duct, the oropharynx, the digestive system, and skin.[5,6] In our case, cyclopentolate eye drops could have been absorbed by capillaries and reached the brain via angulus venosus of deep cerebral veins and cavernous sinuses.[6,9] There have been various reports of systemic toxicity following topical application of cyclopentolate eye drops.[4,5,7] This phenomenon of systemic toxicity with cyclopentolate has been observed after multiple installations of the cycloplegic eye drops especially in children with neurological deficits.[5,6] Children are especially prone to cyclopentolate toxicity due to their lower body weight.[6] Children are prone to both physical and behavioural changes due to cyclopentolate toxicity.[7,8] Physostigmine is the antidote of choice as it readily crosses the blood–brain barrier. Commonly used anticholinesterases such as neostigmine, pyridostigmine, and edrophonium do not cross the blood–brain barrier, and are thus not useful.[6]

Steps that can be taken to reduce systemic absorption and toxicity includes using the lowest available concentration of the drug, not exceeding the recommended number of drops (instill one drop of 0.5% or 1% in eye, followed by one drop of 0.5% or 1% after 5 min, if necessary), occluding the lacrimal passage after topical administration, blotting away the excess drops after administration.

Conclusion

The present case highlights the important side effects of a topically administered drug. One should be aware of all the adverse effects of the drugs which they are prescribing routinely, so that optimum treatment can be given. The medical and paramedical staff should use the drug in the prescribed dosages and appropriate methods to minimize systemic absorption. The patients prescribed with this drug should also be counseled regarding the possibility of these side effects in the future and should be told to apply finger pressure to the lacrimal sac during and for about 1-2 minutes following topical instillation of cyclopentolate eye drops to minimize these effects.

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