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Case report

Transient anisocoria in a patient treated with nebulized ipratropium bromide

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ABSTRACT

Purpose: We present a case report of a 44-year old female patient with complicated pneumonia who developed anisocoria after treatment with inhaled ipratropium bromide. Discontinuation of ipratropium bromide treatment led to complete resolution of anisocoria.

Observation: A 44-year old female patient was admitted to the Department of Pulmonology due to high body temperature (40.0 °C), coughing and general weakness. After a general examination and tests the patient was diagnosed with right-sided pneumonia. Since spirometry test showed signs of bronchial obstruction, pulmonologist indicated inhalation therapy with ipratropium bromide. Soon after ipratropium bromide therapy was initiated, the patient noticed enlarged left pupil and stated that some aerosol reached her left eye during the inhalation therapy. After consulting neurology and monitoring neurological signs, ipratropium bromide treatment was discontinued. Twenty-four hours after discontinuing the ipratropium bromide treatment anisocoria was completely resolved.

Conclusions and importance: Presence of anisocoria may be a concerning neurological sign. If there are no other neurological or ophthalmological signs and symptoms and a recent ipratropium bromide inhalation treatment exists in the patient's history, we should consider iatrogenic side-effect of drugs as a possible reason of anisocoria and possibly spare the patient extensive and invasive diagnostic procedures that can also raise costs of treatment significantly. Observing neurological status and testing with 1% pilocarpine solution may be necessary to determine the etiology of this condition.

1. Introduction

Anisocoria may be a sign of uncal herniation due to acute intracranial hypertension or another intracranial process, such as tumor or hemorrhage. New onset of anisocoria may lead to a specialty consultation as well as neuroimaging, which can raise costs of treatment significantly and expose a patient to additional stress and risk (radiation, allergic reactions etc.). When a diagnosis of increased intracranial pressure is confirmed, these potentially expensive tests are appropriate. However, sometimes it is wise to consider other possible reasons of unilateral dilated pupil, and possibly spare the patient unnecessary expense. Here we present a case report of a 44-year old female patient with complicated pneumonia who developed anisocoria after inhaled ipratropium bromide treatment.

2. Case report

A 44-year old female patient was admitted to the Department of Pulmonology due to high body temperature (40.0 °C), coughing and general weakness. After a general examination and tests (X-ray of thorax, laboratory tests, spirometry) the patient was diagnosed with right-sided pneumonia. The patient was administered appropriate antibiotics. Since spirometry test showed signs of bronchial obstruction, pulmonologist indicated inhalation therapy with ipratropium bromide (1 ml of 0.025 mg/ml ipratropium bromide solution diluted in 2 ml of normal saline solution, inhaled during 15 min.). Soon after ipratropium bromide solution inhalation started, the patient noticed blurry vision in her left eye and noticed in the mirror that her left pupil was larger. She also emphasized that she had problems with the fit of the inhalation mask, and that there was some aerosol reaching her left eye occasionally during the inhalation.

An ophthalmological examination showed that best corrected visual acuity was 20/20 in both eyes, and intraocular pressure was

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within the normal range (13 mmHg). There was no conjunctival reaction in either eye, and optical media was transparent. The left pupil was larger than the pupil in the other eye and reaction to light exposition was slower and incomplete. Pupillary reactions in the right eye were normal. A fundus examination showed normal posterior segment bilaterally. Since the patient reported a poorly fitting of inhalation mask and did not show any other sign of neurological disorder, it was advised to monitor her neurological status and consult the neurologist for need of further test, such as neuroimaging.

As the patient also developed sinus tachycardia after ipratropium bromide inhalation, treatment was held.

Approximately six hours after discontinuing the ipratropium bromide treatment, the anisocoria was almost completely resolved, and after twenty-four hours there was no sign of anisocoria.

3. Discussion

Patients with bronchial obstruction are often treated with nebulized ipratropium bromide, which is inhaled through a face mask. Ipratropium bromide is a derivative of atropine that antagonizes acetylcholine at muscarinic cholinergic receptors.[1] Aerosol inhalation of ipratropium bromide has maximum effect 30–60 minutes after administering and duration of action is 3–6 hours.[2] It has rare side-effects, such as nausea, constipation and headache and it should be administered with caution in patients with angle-closure glaucoma (ACG) since cases of acute ACG after ipratropium bromide treatment were reported.[3–5]

When the mask is not fitted properly, there is a possibility of aerosol leakage, which can cause a contact with eye surface and can induce mydriasis,[6–8] that can imitate an acute neurological sign. It is often considered that sudden onset anisocoria is a sign of uncal herniation until proven otherwise. This may lead to a series of such tests as neuroimaging that may significantly raise costs of treatment and potentially lead to discomfort. Sometimes it is possible to avoid unnecessary interventions when we have justified suspicion that anisocoria may be result of other reasons. Even then, neurological examination and monitoring of vital signs and neurological signs development is obligatory. Therefore, in patients without significant risk for intracranial hemorrhage, who do not have a previous diagnosis of intracranial tumor or other possible cause of intracranial hypertension and have absence of other signs of this condition (change of mental status, sings of hemiparesis, ocular motility impairment, ptosis), other possible reasons of anisocoria should be considered prior to undergoing aggressive tests. One of possible causes is treatment with nebulized anticholinergics, such as ipratropium bromide.

Ipratropium bromide acts as acetylcholine antagonist on muscarinic receptors causing bronchodilation when inhaled as aerosol. When it is inadvertently administered to the eye, it affects muscarinic receptors and causes pupil dilation that can imitate acute neurological condition of uncal herniation. It is important to be able to differentiate this dangerous life-threatening condition from benign iatrogenic pupil dilation that we have described. Therefore, it is necessary to analyze the patient's medical history, looking for possible risks. It is also important to be aware of presence of other concerning signs and symptoms such as headache, ophthalmoplegia, or change of mental status. If all these factors are excluded and we have history of recent usage of inhaled ipratropium bromide, we can suspect of pharmacologic pupillary dilation due to the ipratropium bromide justifiably.

If exposure to ipratropium bromide is unclear, there is a particular test that may be useful to confirm pharmacologic mydriasis. When 1% pilocarpine is administered topically to conjunctiva, it will cause constriction of circular muscles of iris and cause miosis in patients with dilated pupil due to third nerve compression such as in uncal herniation. But when acetylcholine antagonist, such as ipratropium bromide, is administered to the eye prior to pilocarpine, it will block muscarinic receptors and prevent miosis in these patients, which can bea sign of iatrogenic anisocoria.[7,9,10]

4. Conclusions

Presence of anisocoria may be a worrisome neurological sign. If there are no other neurological or ophthalmological signs or symptoms and there is history of recent ipratropium bromide treatment, we should consider iatrogenic side-effect of drug as a possible reason of anisocoria and possibly spare the patient extensive and invasive diagnostic procedures that can also raise costs of treatment significantly. Observing neurological status and consideration of testing with 1% pilocarpine solution can be helpful in determining the etiology of this condition.

Patient consent

Patient consented orally to publication of the case.

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Authorship

All authors attest that they meet the current ICMJE criteria for authorship.

Conflict of interests

The authors have no financial disclosures.

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