ANGEL'S TRUMPET (BRUGMANSIA ARBOREA) AND MYDRIASIS IN A CHILD - A CASE REPORT

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ABSTRACT

We report a case of anisocoria in a 6-year old child who felt out of an inflatable swimming pool in the garden. After instillation of pilocarpine 1% the dilated pupil constricted, which is an important clinical sign associated with intracranial trauma. There was evidence of exposure to angel's trumpet (Brugmansia arborea), a plant known to contain anticholinergic substances. As the results of further neurological examination turned out to be normal, we believe the mydriasis was due to an accidental exposure to angel's trumpet. The time lag between exposure and presentation at the emergency room, the probably low volume of the plant extract in the eye and the unpredictable concentration of alkaloids in the plant, can influence and question the reliability of the pilocarpine test in this case.

RÉSUMÉ

Une fillette de 6 ans a présenté une anisocorie après une chute hors d'une piscine gonflable dans le jardin. Après instillation de pilocarpine 1% la pupille dilatée allait en miosis, ce qui suggère un traumatisme crânien. La fillette avait probablement été en contact avec la Brugmansia arborea (trompette des anges, stramoine en arbre), une plante contenant des substances anticholinergiques. Comme l'examen neurologique était normal, nous avons supposé que la cause de la mydriase était le contact accidentel avec la Brugmansia arborea. La fiabilité du test à la pilocarpine dans notre cas peut être mis en question à cause du temps écoulé entre le contact et la présentation aux urgences, le volume d'extrait de plante probablement limité dans l'œil, et une concentration imprévisible des alkaloides dans la plante.

SAMENVATTING

Een 6 jarig meisje vertoonde anisocorie na een val uit een opblaasbaar zwembadje in de tuin. De gedilateerde pupil ging in miosis na indruppeling met pilocarpine 1%, wat wijst op een mogelijk intracraniëel trauma. Het meisje was zeer waarschijnlijk blootgesteld geweest aan Brugmansia arborea (engelentrompet), een plant die anticholinergische stoffen bevat. Omdat verder neurologisch onderzoek normaal bleek, was de mydriasis volgens ons te wijten aan een accidenteel contact met Brugmansia arborea. De tijdsduur tussen de blootstelling en het onderzoek op spoedgevallen, het vermoedelijk laag volume van plantenextract in het oog en de onvoorspelbare concentratie van alkaloïden in de plant, kunnen de betrouwbaarheid van de pilocarpine test in deze casus in twijfel trekken.

KEY WORDS

Anisocoria, Brugmansia arborea (angel's trumpet), pilocarpine

MOTS-CLÉS

Anisocorie, Brugmansia arborea (trompette des anges, stramoine en arbre), pilocarpine

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INTRODUCTION

Solanaceae are often used as ornamental plants. Angel's trumpet is a frequently found kind in gardens. It is known to contain alkaloids such as scopolamine and atropine. Accidental mydriasis from exposure to plant components in humans and animals has been reported (4, 5). To distinguish atropine-like intoxication causing anisocoria from a potentially dangerous intracerebral process, the pilocarpine 1% test is used. In this case, however, the pilocarpine test did not reveal previous contact with an atropine-like substance.

CASE REPORT

A 6-year old girl was brought into the emergency unit at 10.00 pm because of a sudden onset anisocoria which had started at 4.00 pm. Earlier that day, she had fallen several times while playing in an inflatable swimming pool in the garden. No relevant drug history nor accidental intoxication was present. The parents denied the presence of poisonous plants near the pool. On examination we noticed mydriasis with absence of the pupillary light reflex and the consensual pupillary light response in the left eye. The consensual pupillary light reflex of the right eye was normal. The anterior chambers were normal without inflammatory changes, both irises were normal. The fundus examination was normal. Extraocular movements were intact.

At this moment an intracranial trauma or tumoral mass could not be excluded, neither an accidental inoculation of the left eye with an atropine-like substance. Pilocarpine 1% instillation induced constriction of the left pupil. A CT-scan of the brains was performed, but showed no evidence of a subdural hematoma. Besides the anisocoria, no abnormal neurological signs were noticed. The next day, both pupils were normalized with normal light responses. The parents found a flower called angel's trumpet in the garden. The girl confirmed touching it while falling out of the inflatable swimming pool. This plant belongs to the family Solanaceae (genus Brugmansia or Datura) and is known to cause eye dilation due to anticholinergic substances when the juice from the plant comes into contact with the eye.

DISCUSSION

Mydriasis after accidental instillation of plant components of the Solanaceae family into the eye has been reported previously. Flowers that can induce parasympatholytic effects in the eye are deadly nightshade (Atropa belladonna), angel's trumpet (Brugmansia arborea), thorn apple or jimsonweed (Datura stramonium), and black henbane (Hyoscyamus niger) (4, 5, 9, 10, 11). There is considerable confusion in medical literature about the names in this group of plants. Angel's trumpet was originally part of the genus Datura, but is now placed in a separate genus called Brugmansia (6).

Alkaloids are nitrogen-containing bases of a vegetable origin. The alkaloids found in the Solanaceae which cause mydriasis are primarily the tropanes atropine and scopolamine. Tropanes form an important subdivision of the alkaloids, with as common property a methylated nitrogen atom at one end of a ring structure. They are anticholinergics and block the acetylcholine receptors of the muscarinic subtype (the other subtype, nicotinic receptors, is not affected by tropanes). They prevent acetylcholine to enter the effector cells, resulting in paralysis of smooth muscles, such as the ciliary muscle and the sphincter pupillae. Absorption from the conjunctiva bypasses the first-pass of the liver and can cause systemic effects like tachycardia, dry mouth, confusion, visual and auditory hallucinations. Scopolamine produces mydriasis and cycloplegia of rapid onset, lasting 4 to 6 days, with a peak after 15 minutes. After the instillation of atropine, mydriasis is maximal at 30 minutes and lasts for 7 to 12 days (6,9).

The Brugmansia genus (angel's trumpet) contains a concentration of tropane alkaloids ranging from 2,5 mg/g to 7 mg/g. Per blossom, one found 0.20 mg of atropine and 0.65 mg of scopolamine (3). In Datura (thorn apple), the seeds have the highest alkaloid content of the plant: 2.71 mg/g of atropine and 0.66 mg/g of scopolamine. Leaves of the thorn apple contain 0.2 to 0.45 mg/g of total alkaloids (8). The alkaloid concentration in the leaves, stem, flowers and seeds of an individual plant differ markedly. It even changes with season and hydration, so it is almost impossible to determine the exact dose of the alkaloids in the plant compo-

nent that comes in contact with the eye (6). Ingestion of 10 to 50 mg of atropine appears to be toxic for adults, 4 to 5 mg may be fatal to small children.

The duration of the mydriasis after exposure to a plant component varies from 24 hours to 1 week. The presentation of the mydriasis can differ from a maximally dilated and non-responsive pupil to variable light responses. These differences are probably related to the various ways of contact with the plants. The quantity of sap and the length of its exposure has a big influence on the clinical expression. For instance, rubbing the eye right after contact with a leaf or flower can give dilation of one day's duration, while a broken stalk exuding sap in the eye can give a fully dilated pupil for several days (4, 5). Ingestion of a part of a plant causes mydriasis in 100% of the cases with a median duration of 31 hours (6).

When dealing with anisocoria in a child, the first step is to confirm that no ocular condition like iris atrophy, optic nerve coloboma or hypoplasia, glaucoma, lens displacement or posterior synechiae is present. Secondly, the consensual pupillary reflex of the right eye indicates that the afferent pathway is functional. In the next step, one has to distinguish a parasympathetic pathway lesion from a iris muscle sphincter impairment, like posttraumatic iridoplegia, or from the presence of an atropine-like substance in the eye. Young children with blond hair or blue eyes may be especially sensitive to the effects of tropanes.

Pilocarpine stimulates the acetylcholine receptors on the smooth muscle of the iris sphincter. Atropine and scopolamine competitively inhibit the action of acetylcholine on the muscarine receptors. If there is a pharmacologic blockage of the receptors, the pupil stays in mydriasis when one drop of pilocarpine 1% is given. In lesions of the cranial nerve III the pupil constricts rapidly (1). In a normal eye the pupil constricts within 15 minutes after instillation of pilocarpine, peaking at 30 to 60 minutes. The effect of pilocarpine drops is individual, but is unrelated to the subject's age or sex. It is not significantly different between eyes with different iris colours. Factors known to affect drug penetration into the anterior chamber are not responsible for the differences in drug effect on pupil size. Pupil variability in response to pilocarpine may be related to volume and concentration of the drug. Pupillary constriction increases in proportion to the volume and concentration of pilocarpine. Constriction is greater in darkness or dim light than in bright light (2,7).

In this case, pilocarpine 1% caused miosis of the dilated pupil. Because of the negative neurological and neuroradiological examinations and the very high chance of exposure to angel's trumpet, we believe the pilocarpine test failed in making the right diagnosis. This can be explained either by a low volume of plant extract, by the unpredictable concentration of alkaloids or by involuntary instillation of a higher volume of pilocarpine. Moreover, the patient came to the emergency room 6 hours after exposure, which is a long time after the maximal effect of the alkaloids. All these factors can influence the predictive value of the pilocarpine test.

CONCLUSION

Suspicion of an accidental intoxication should always arise when unilateral mydriasis is found in patients without evidence of a retrobulbar or intracerebral process. Questions about playing or working in the garden should always be asked. Because of the variability of the concentration of alkaloids in plants of the same species, it is difficult to determine the amount of alkaloids that came into contact with the eye. A time lag of several hours between the first symptoms and the pilocarpine test, makes the predictive value of the test disputable. The pilocarpine 1% test is very useful in determining the cause of mydriasis of sudden onset, but it should be pointed out that this test is probably not always completely reliable.

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