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Joseph Cox

John Bauer

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HENRY FORD MACOMB HOSPITAL

Joseph Cox D.O., John Bauer M.D., Department of Emergency Medicine
Henry Ford Health System, Detroit, Michigan

Introduction

Anisocoria is a condition characterized by unequal pupil size. The potential causes of anisocoria range from benign processes to potentially life threatening processes. Therefore, determining the etiology is of great importance. Mydriasis, more specifically, is when anisocoria is caused by an abnormally dilated pupil. There are several well-known causes of this phenomenon, however the objective of this clinical case study is to present an unusual cause of mydriasis to help provide more insight into a potentially challenging diagnosis.

Case

A 14-year-old female presented to the ED with chief complaints of sore throat, fatigue, and a dilated left pupil. She had headache at the time of symptom onset which resolved prior to presentation. She wears contact lenses, changing them daily, and denied any changes to her regimen or exposure to any chemicals. She denied any traumatic injury or visual changes, and only noticed that her pupils were different in size because somebody else informed her.

PMH: None
PSX: None
Fam Hx: None
Social: Never smoker, denies drug use
Allergies: None
Meds: None
Initial Vitals: Pulse 99, BP 149/81, Resp 20, SpO2 99%, Temp 37.2

Physical Exam:
Constitutional: Well developed, well nourished, in no acute distress
HEENT: AT/NC, TMs normal, conjunctivae normal, posterior oropharyngeal edema/erythema, pupils unequal, with left pupil approximately 4mm larger than right, pupils round, and reactive to light, EOM intact, fundus exam normal
Neck: anterior cervical lymphadenopathy
Cardio: normal rate, regular rhythm, normal heart sounds, intact distal pulses
Pulm: Breath sounds normal, no respiratory distress
GI: abdomen soft, nontender, nondistended, bowel sounds normal
Neuro: Alert and oriented, GCS 15, CNII-XII intact, normal strength, no sensory deficits, negative rhomberg sign
MSK: Normal range of motion
Skin: warm and dry, no rash, not diaphoretic, no jaundice

Ophthalmology Exam:
Visual Acuity (Snellen, with contacts): Right- 20/30, Left- 20/15
Tonometry: Right- 19, Left- 18
Pupils: unequal, with left pupil approximately 4mm larger than right, pupils round, and reactive to light
Visual Fields: Right-full, Left-full
Extraocular Movement: Right-full, Left-full
Slit Lamp: Right and Left- cornea clear, anterior chamber deep and quiet, iris round and reactive, lens clear, vitreous normal
Fundus: Right- disc normal, C/D ratio 0.3, macula normal, vessels normal
Left- disc normal, C/D ratio 0.35, macula normal, vessels normal

Testing in ED was only significant for positive infectious mononucleosis antibody screen. Patient had no other findings concerning for malignant underlying process. She was discharged home with symptomatic treatment of mono, instructions to remove contact lens, and to follow up ophthalmology. After discharge, patient was evaluated by ophthalmologist and subsequently referred to neuro-ophthalmologist due to unexplained persistent mydriasis. Prior to neuro-ophthalmology evaluation her symptoms resolved, 8 days after initial onset. After further workup by neuro-ophthalmologist, it was determined that her transient mydriasis was related to autonomic nervous system irritability secondary to regional inflammation from infectious mononucleosis pharyngitis.

Discussion

Pupillary size is controlled by the two opposing muscle groups of the iris; the dilator and sphincter pupillae. The muscles are regulated by reflex mechanisms involving the autonomic nervous system. Pupillary constriction is mediated via the parasympathetic nervous system in response to light and near stimuli. Pupillary dilation is mediated via the sympathetic nervous system in response to dark. Anisocoria occurs when there is a disruption in one of the pathways.

When evaluating a patient with anisocoria, the first step is taking a thorough HPI to obtain any relevant history that may give clues to the etiology. History of ocular trauma, prior eye disease/procedures, use of topical medications, exposure to toxins/drugs (including plants), or other associated ocular/neurological symptoms such as diplopia, ptosis, and impaired extraocular movements are important. Then, you must determine which pupil is abnormal, the large or small one. To do so, you must evaluate the pupils in light and dark conditions. If the anisocoria is greater in the dark, then the small pupil is abnormal, known as miosis. This indicates poor pupillary dilation, an abnormality in the sympathetic system. If the anisocoria is greater when exposed to light, then the large pupil is abnormal, known as mydriasis. This indicates poor pupillary constriction, an abnormality in the parasympathetic system. It is also important to understand that a small amount of anisocoria is a normal finding in about 20% of the population. This is known as physiologic anisocoria, which usually involves less than a 0.4mm difference between pupils with no dilation lag. This means the anisocoria does not get worse or better be exposed to light/dark.

Common causes of miosis:
. Anterior Uveitis
-inflammation of the iris and/or ciliary body
. Previous ocular surgery
. Pseudoexfoliation syndrome
-gradual deposition of fibrillary white flaky material from the lens onto ocular tissues, age related
. Pharmacologic constriction
-pilocarpine
. Horner Syndrome
-sympathetic lesion causing miosis/ptosis/anhidrosis
-diagnosed with apraclonidine drops, which reverses symptoms

Common causes of mydriasis:
. Posterior synechia
-condition where the posterior iris forms adhesions to the anterior lens
. Previous ocular surgery
. Ocular trauma
-injury to pupillary sphincter muscle
-pupil may have irregular shape
-abnormality is isolated, without ptosis/diplopia
. Pharmacologic agents
-phenylephrine, clonidine, apraclonidine, cyclopentolate, scopolamine patches, aerosolized ipratropium
-topical medications for ocular conditions (atropine, cyclophentolate, clonidine, apraclonidine)
-Autonomic drugs such as scopolamine patch
-Aerosolized anticholinergic (ipratropium)
.Toxins
-jimsonweed, has anticholinergic properties
. Adie's Pupil (aka Tonic pupil)
-parasympathetic denervation at the level of the ciliary ganglion and postganglionic nerves, usually idiopathic
-minimal constriction with light, but reacts to accommodation and becomes smaller than unaffected pupil
. Third nerve palsy
-mydriasis associated with extraocular movement deficit and/or ptosis
-lesion located anywhere along course of third cranial nerve
-neuroimaging and/or lumbar puncture often warranted due to concern for aneurysm or subarachnoid hemorrhage

Conclusion

Anisocoria results from one pupil having either impaired constriction or dilation. The parasympathetic and sympathetic pathways mediate these processes. To determine which pathway is involved, examination in light/dark conditions, and evaluating pupillary response to light and near stimuli is used. In mydriasis, the anisocoria is greater in light conditions signifying an abnormal ability to constrict, or in other words, an interruption in normal parasympathetic function. Common causes of mydriasis include trauma, oculomotor nerve palsy, tonic pupil, toxins and pharmacological etiologies. Infection is not typically considered one of the common causes of this condition, but as seen in the case presented, do not forget to include it in your differential, along with any other process that may interfere with the autonomic innervation to the pupil. This knowledge may aid in early diagnosis and help to prevent unnecessary testing and further workup.

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