

CLINICAL VIGNETTE

Unilateral Mydriasis: Emergent or Benign

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Introduction

Anisocoria found by the primary care physician can range from a benign finding to a life-threatening condition. Fear of missing a diagnosis of an intracranial aneurysm will result in a constellation of orders, including radiologic imaging, that might lead to further invasive work up, potential harms, and increased cost. Understanding the neuroanatomy and physiology that affects pupillary size is integral to recognizing whether a dilated pupil is a true emergency or benign.

Case Report

A 21-year-old male was noted to have a new left dilated pupil on physical exam. He had been complaining of problems in his left eye following eye trauma two months prior. He injured his left eye playing basketball after sustaining direct contact with a high-speed basketball. At the time, he noted immediate “stars” and subsequent headache. Vision subjectively felt diminished. He did not seek immediate attention, however, two days later was evaluated at a local emergency room because of ongoing visual compromise and headaches. A corneal abrasion was diagnosed, and he was given a prescription for erythromycin drops. He did not obtain the drops until a week later due to final exams. Over the next two weeks, vision seemed to improve, but he continued to experience a sensation that his vision was not 100% clear, along with intermittent headaches, thus he made an appointment to see an ophthalmologist. He was told that his corneal abrasion was 90% healed, and given reassurance that his orbital trauma would improve with time. Vision was 20/20 in both eyes. A month after this evaluation, he made another ophthalmology appointment for a second opinion as his left eye continued to bother him. A diagnosis of blunt eye trauma was given, along with a diagnosis of mild blepharitis. He was told that the corneal abrasion had healed. Additionally, the doctor advised him to visit an ophthalmologist annually.

Two months after the initial basketball injury, patient presented to his primary care physician’s office with this dilated left pupil. Vision was not subjectively affected, but family members brought the finding to his attention.

Past medical history is only significant for allergic rhinitis. He is a single college student. Diet is unremarkable, he does not smoke and drinks occasionally. He is not sexually active. Physical exam is notable for anisocoria with the left pupil double the size of the right pupil. Pupillary reflex on the right is normal, however only minimal to nonresponsive on the left.

Consensual response occurred on the right, and again only minimal to none on the left. Extraocular muscles are intact. Accommodation is also affected in the left eye. Visual acuity remains 20/20. The rest of the neurologic examination is normal. CT angiogram and MRI of the brain were not ordered. Why?



Figure. Visual examination revealing an asymmetrically dilated and nonreactive left pupil. [Figure used with permission]

Discussion

Unilateral mydriasis can be an ophthalmologic emergency. Emergent evaluation of stroke or aneurysm should be considered anytime an asymmetrically dilated nonreactive pupil is found. The mechanisms of these injuries range from benign causes to an acute third nerve palsy from brain herniation or aneurysm. In a comatose patient, a poorly reactive or dilated pupil would be cause for great concern; however, in a well patient, a third nerve palsy would be a less likely cause. More benign conditions such as iris sphincter abnormalities, pharmacologic dilation, tonic pupil syndrome, or sympathetic irritation are often found.¹

The prevalence of anisocoria can be as high as 18% of patients in certain lighting conditions.² Occasionally, anisocoria may be a longstanding issue, but because there is typically less than a 0.4mm difference, photos might be needed to check if the finding had been present previously.³ Ocular or orbital trauma, as in this patient, can also lead to anisocoria. Eye surgery is a frequently overlooked reason for this finding. Medications can cause mydriasis, although typically this would be bilateral. Handling of topical medications or plants with anticholinergic properties have also been shown to affect only one eye if it had direct exposure.

In order to decide which eye is the abnormal pupil, light and dark exposure is needed to help distinguish which eye is problematic. In a dark room, a small pupil that does not dilate is the abnormal pupil. This is the lack of a sympathetic response. Whereas in a light room, the large pupil would be considered abnormal as it should constrict. This would indicate that there was an abnormality in the parasympathetic system.⁴

If the etiology of the pupillary dilation was from the basketball injury, this would typically suggest an injury to the pupillary sphincter muscle. The degree of reaction to light, or lack thereof, would depend on the extent of the injury. Typically, with just the sphincter muscle affected, there would not be any additional visual effects or ptosis.

Drugs that affect the sympathetic or parasympathetic system can lead to mydriasis.⁵ Stimulation of the sympathetic innervation of the dilator pupillae or inhibition of the parasympathetic innervation to the sphincter pupil can both cause mydriasis. Medications that affect the pupil also do not cause pain, ptosis, or double vision.

Common medications that cause mydriasis include topical eye medications, autonomic drugs, aerosolized anticholinergic drugs, and certain plants with anticholinergic properties. Case reports have shown that scopolamine patches have been implicated.⁶

Mydriasis caused by a third nerve palsy will most likely have extraocular movement deficits and ptosis. If these are found, and typically in an older patient, then brain imaging studies or even lumbar puncture are indicated. Third nerve palsies manifest symptoms depending on the location of the dysfunction, from the oculomotor nucleus to the termination of the third nerve in the extraocular muscles within the orbit, and can be the initial presentation of an underlying neurologic emergency such as intracranial aneurysm. Diagnosis could be facilitated with noninvasive neuroimaging.⁷

Conclusion

In this patient, further history was obtained. No medications or supplements were ingested in the week prior to the onset of the eye finding. He did admit to social drinking during a visit to Catalina Island in the 24 hours prior. He denied any recreational drugs. The patient also then revealed that he experiences seasickness while riding on boats, and he had obtained a scopolamine patch to use for the trip. He recalled that he had placed the patch behind his left ear, and that he had removed it once he arrived back on the mainland, several hours prior to the eye findings. He was unclear as to whether he could have touched his eye after handling the patch. Luckily, the patient's mydriasis and lack of pupillary reactivity spontaneously improved over the next 2 days. Without this component of his social history, the sports injury may have continued to overshadow this case, and he likely would have been sent to the emergency room for neuro-imaging.

Key to any primary care physician's craft is the ability to obtain a thorough history. As the patient did not consider the patch to be a medication, it was only through obtaining elements of the social history and learning that the patient had been on a boat trip to Catalina Island, that the use of a scopolamine patch was revealed. No fancy or expensive tests were needed, only the tincture of time.

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