

# Photo Quiz

## An Asymmetrical Pupil

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**FIGURE 1**



**A 73-year-old woman** presented with asymmetrical pupils. She had no loss of vision, double vision, eye pain, light sensitivity, or abnormal sweating. The patient had a history of bilateral cataract surgery, repair of right retinal detachment, and repair of the right orbital bone after a traumatic event. She had a 30-pack-year history of smoking. Although the patient had several medical conditions, none involved the eye or use of ophthalmic medications.

On physical examination, the external eyelids were normal in appearance with no findings of ptosis. The sclerae were clear bilaterally, with an approximately 1-mm difference in pupillary size observed in light and darkness (*Figure 1*). Pupils were round and reactive to light. Cranial nerves were intact with no abnormality noted on confrontation of visual fields.

Recent lung cancer screening with low-dose computed tomography revealed multiple lung nodules; however, none

were in the apical region. Additionally, magnetic resonance imaging with and without contrast media was obtained during a prior emergency department visit as part of a stroke workup. It showed chronic microvascular ischemic disease with no evidence of a mass.

### Question

Based on the patient's history and physical examination findings, which one of the following is the most likely diagnosis?

- A. Horner syndrome.
- B. Physiologic anisocoria.
- C. Third nerve palsy.
- D. Traumatic mydriasis.

**See the following page for discussion.**

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## Discussion

The answer is B: physiologic anisocoria. Physiologic anisocoria is the most common etiology of uneven pupil size, occurring in approximately 20% to 24% of the U.S. population. It is a benign condition, and no treatment is required.<sup>1-3</sup>

The diagnosis of physiologic anisocoria is clinical, based on history and physical examination findings. Reviewing old photos or driver's licenses of the patient can assist in establishing the diagnosis because physiologic anisocoria is a persistent and long-standing condition.<sup>3,4</sup> The anisocoria is usually equal in light and darkness.<sup>3</sup>

Horner syndrome presents as the classic triad of unilateral miosis, ptosis, and anhidrosis.<sup>5</sup> The anisocoria is greater in darkness than in light, and the abnormal pupil is typically the smaller pupil.<sup>3</sup> Evaluation includes urgent imaging, including magnetic resonance imaging and magnetic resonance angiography of the neck, to rule out carotid dissection. Images should extend to the hypothalamus and upper chest to identify lesion location.<sup>3,6</sup>

There are multiple etiologies for third nerve palsy, including trauma, cerebrovascular disease, and inflammatory disorders. Signs and symptoms include diplopia, ptosis, and impaired extraocular movements. The anisocoria is greater in the light, and the abnormal pupil is typically the larger pupil. Similar to Horner syndrome, third nerve palsy requires urgent neuroimaging, including computed tomography angiography, to evaluate for presence of an intracranial aneurysm.<sup>6</sup>

Traumatic mydriasis is caused by ocular injury to the pupillary sphincter muscle.<sup>3</sup> The anisocoria is more prominent with bright light because the pupil is unable to constrict as a result of the injury.

**The opinions** and assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the U.S. Army Medical Department, the U.S. Army Service at large, or the Department of Veterans Affairs.

## SUMMARY TABLE

Condition	Characteristics
Horner syndrome	Classic triad of unilateral miosis, ptosis, and anhidrosis; the anisocoria is greater in darkness; the abnormal pupil is typically the smaller pupil
Physiologic anisocoria	Persistent and long-standing anisocoria; the anisocoria is typically equal in light and darkness
Third nerve palsy	Diplopia, ptosis, and impaired extraocular movement; the anisocoria is greater in the light; the abnormal pupil is typically the larger pupil
Traumatic mydriasis	History of trauma to the eye (e.g., eye surgeries, ocular or orbital trauma); anisocoria is greater with bright light

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## References

1. Steck RP, Kong M, McCray KL, Quan V, Davey PG. Physiologic anisocoria under various lighting conditions. *Clin Ophthalmol*. 2018;12:86-89.
2. Lam BL, Thompson HS, Corbett JJ. The prevalence of simple anisocoria. *Am J Ophthalmol*. 1987;104(1):69-73.
3. Gross JR, McClelland CM, Lee MS. An approach to anisocoria. *Curr Opin Ophthalmol*. 2016;27(6):486-492.
4. Kedar S, Biousse V, Newman NJ. Approach to the patient with anisocoria. July 29, 2017. UpToDate. <https://www.uptodate.com/contents/approach-to-the-patient-with-anisocoria> (subscription required). Accessed December 3, 2018.
5. James B, Bron A. *Lecture Notes: Ophthalmology*. 11th ed. West Sussex, UK: Wiley-Blackwell; 2011.
6. Kruger JM, Lessell S, Cestari DM. Neuro-imaging: a review for the general ophthalmologist. *Semin Ophthalmol*. 2012;27(5-6):192-196. ■