A rare cause of anisocoria in the emergency department: a case of Adie pupil

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Introduction: Anisocoria is an important clinical sign of serious neurological conditions, including third cranial nerve palsy, intracranial hemorrhage, and uncal herniation. However, rare benign disorders can cause anisocoria. An Adie pupil is characterized by a tonically dilated pupil with poor or absent light reaction. When associated with diminished deep tendon reflexes, it is referred to as Adie–Holmes syndrome. Typically affects young women and is unilateral in approximately 80% of cases. This report describes a case of an Adie pupil in a male patient.
Case
A 39-year-old man presented with blurred vision and a dilated right pupil upon awakening. He reported no history of trauma, headache, diplopia, nausea, or systemic illness. Vital signs were normal. Neurological examination was unremarkable except for anisocoria: the right pupil was enlarged and nonreactive to light.
Optical coherence tomography demonstrated retinal nerve fiber layer (RNFL) thicknesses of 87 µm in the right eye and 86 µm in the left eye, both within normal limits. Non-contrast cranial computed tomography (CT) and contrast-enhanced magnetic resonance imaging (MRI) were unremarkable. Dilute pilocarpine testing confirmed the diagnosis of Adie pupil syndrome, and the patient was discharged with a recommendation for neuro-ophthalmology follow-up.
Discussion: Adie syndrome is typically idiopathic and is rarely associated with infections (such as syphilis, varicella, or Lyme disease), autoimmune disorders (Sjögren's syndrome or lupus), or neoplastic disease. Degeneration of the ciliary ganglion leads to cholinergic denervation hypersensitivity of the iris sphincter, causing the abnormal light response and a positive reaction to dilute pilocarpine.
In an acute setting, it is essential to exclude life-threatening causes of anisocoria; neuroimaging is indicated when headache, diplopia, ptosis, or neurological deficits are present. In this case, normal CT and MRI excluded structural lesions, normal RNFL thickness excluded optic nerve pathology, and a positive pilocarpine test confirmed the diagnosis. Adie syndrome may progress to areflexia and autonomic dysfunction, such as segmental anhidrosis (Ross syndrome), necessitating long-term follow-up.
Conclusion: Adie pupil is rare and typically with unilateral mydriasis. Emergency physicians should be familiar with its clinical features and diagnostic approach to prevent unnecessary interventions and facilitate appropriate referral.
Keywords: Anisocoria, Adie pupil, Tonic pupil.

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List of Abbreviations

CT	Computed tomography
MRI	Magnetic resonance imaging
RNFL	Retinal nerve fiber layer

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Ethical approval
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