Diagnostic Challenge

Answer

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The correct diagnosis is c) intracranial aneurysm.

The patient's physical examination findings demonstrate a left cranial nerve III/oculomotor palsy (OMP) with pupillary involvement. A small left subarachnoid hemorrhage was found on computed tomography (CT) of the head. CT angiography demonstrated a large posterior communicating artery aneurysm causing the compressive neuropathy (Figure 2).

Ophthalmoplegic migraine is a recurrent headache associated with paresis of one or more ocular nerves. It is very uncommon outside the pediatric and young adult population and therefore a less likely cause of our patient's symptoms. This "cranial neuralgia" can sometimes cause permanent deficits.[1]

Traumatic cranial nerve palsies result from severe blows to the head, often with skull fractures and a history of loss of consciousness.[2–4] This is not suggested from our patient's history and presentation.

Ischemic third nerve lesions present with pupillary sparing up to 90% of the time. This is secondary to lack of damage to the superficial periphery of the third nerve, where the majority of pupillomotor fibers are thought to pass.[5] Risk factors for microvascular disease are often present and include diabetes, hypertension, and increased cholesterol. Our patient had pupillary involvement, and although an ischemic cause is still possible, his lack of risk factors makes this diagnosis less likely.

OMP secondary to giant cell arteritis is most often concomitant with other cranial nerve deficits and clinical signs suggestive of the diagnosis. Patients present with temporal artery tenderness, unilateral vision loss, and jaw claudication,[6,7] which our patient did not have.

COMMENTARY

The oculomotor nerve supplies the levator muscle of the eyelid and the four extraocular muscles: medial rectus, superior rectus, inferior rectus, and inferior oblique. It also causes pupillary constriction via parasympathetic fibres that innervate the smooth muscle of the ciliary body and iris sphincter.[2]

Deficits resulting from OMP can cause "external dysfunction," including ptosis and paralysis of eye adduction, elevation, and depression, or "internal dysfunction" manifested by a large, unreactive or sluggish pupil. For isolated OMPs, the degree of external and internal dysfunction can be used to determine the type and urgency of evaluation required[8] (Table 1).

Complete internal dysfunction with any external dysfunction should be assumed to be due to aneurysal compression until proven otherwise.[8–10] These aneurysms most commonly occur in the posterior communicating artery; however, aneurysms involving the internal carotid artery and basilar artery have also been reported.[2,11] Imaging options for diagnosis include computed tomographic angiography (CTA), contrast-enhanced magnetic resonance imaging with magnetic resonance angiography (MRA), and cerebral angiography. CTA and MRA have a sensitivity of 95 to 98.5% for the detection of aneurysm in a patient with a third nerve palsy; therefore, cerebral angiography, although often considered the gold standard, is not as routinely used given its invasive nature.[8,12–15] Once an aneurysm is suspected, imaging should proceed emergently because of the high associated risk of potentially fatal subarachnoid hemorrhage.[11]

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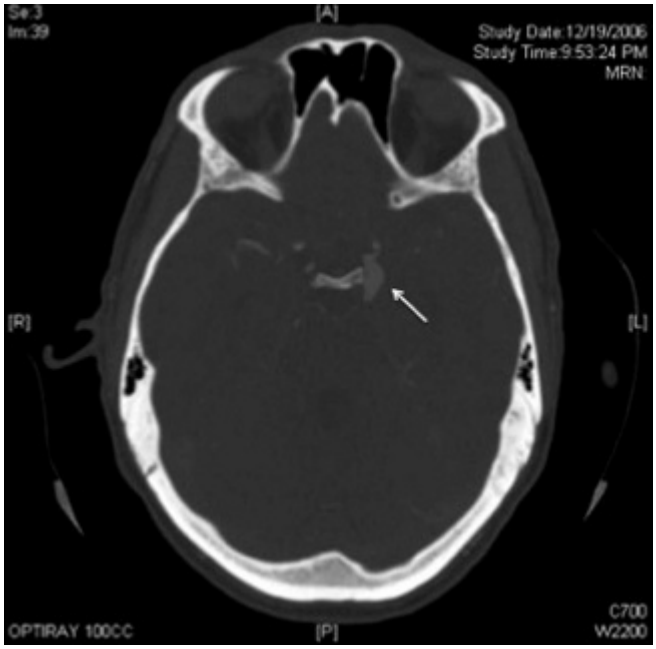

Figure 2. Head computed tomographic angiogram demonstrating a large left posterior communicating artery aneurysm (*arrow*).

Sparing of the pupillary sphincter with palsied extraocular muscles is almost never caused by an aneurysm, with minimal case reports reported in the literature.[8,10,16] If the pupil is spared, the OMP is most commonly caused by ischemic injury.[8,10,17] Close observation is an appropriate diagnostic option if the patient has known risk factors for vascular disease.[10]

Table 1. Imaging recommendations based on degree of internal/external extraocular motor dysfunction[8,10,12]

Internal and external dysfunction	Risk of aneurym	Recommended imaging
Internal dysfunction ''blown/partial pupil'' with external dysfunction	Highest	MRI/MRA, CTA If negative, consider cerebral angiography
Internal dysfunction without external dysfunction	Minimal	No imaging
No internal dysfunction with complete external dysfunction	Low if isolated	No imaging; observe
No internal dysfunction with incomplete external dysfunction	Uncertain; may be evolving	MRI/MRA, CTA If negative, consider cerebral angiography

CTA = computed tomographic angiography; MRA = magnetic resonance angiography; MRI = magnetic resonance imaging.

The treatment goal of aneurysmal third nerve palsy is prevention of subarachnoid hemorrhage. This is achieved either by neurosurgical clipping or endovascular coiling.[13,18]

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