

## IMAGES IN EMERGENCY MEDICINE

### Neurology

# Man with diplopia on head tilt

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## 1 | PATIENT PRESENTATION

A 47-year-old male with a past medical history of hypertension, diabetes, and coronary artery disease presented with diplopia for 4 days at the urging of his optometrist (Figures 1 and 2).

## 2 | DIAGNOSIS

### 2.1 | Cranial nerve IV palsy

Extraocular movements are controlled by six muscles and three nerves. The lateral rectus is the primary abductor and is innervated by cranial nerve (CN) VI (the abducens nerve). A sixth nerve palsy produces diplopia on attempted lateral gaze of the affected eye. The medial, superior, and inferior recti and the inferior oblique muscles are all innervated by CN III (the oculomotor nerve); additionally, the levator palpebrae muscle and the sphincter pupillae are innervated via the parasympathetic fibers of CN III. A third nerve palsy produces ptosis, a downward-out position of the affected eye in neutral gaze, and limited ability to adduct the affected eye.<sup>1</sup>

The superior oblique muscle is innervated by CN IV (the trochlear nerve). Fourth nerve palsies are the most difficult to detect, and when isolated and in the absence of trauma, are almost always ischemic or congenital in etiology.<sup>2</sup> Additional etiologies like herpes zoster, migraine, giant cell arteritis, cavernous sinus thrombosis, and space-occupying lesions should also be considered when signs and/or symptoms warrant (although these are exceedingly rare and unlikely to be isolated).<sup>3,4</sup> This palsy often goes unnoticed because other extraocular muscles compensate. The superior oblique is primarily a depressor of the eye, but it serves an important and unique role by intorting the eye (rotating down and inward) on ipsilateral head tilt. Without this



**FIGURE 1** With his head in neutral position, the patient reported blurring of object margins



**FIGURE 2** When tilting his head to the left, the patient reported worsening diplopia. The patient's left eye has a slight upward and outward deviation

important function, patients experience worsening diplopia on ipsilateral head tilt or when performing functions that required downward gaze (eg, descending stairs) and will often compensate by tilting their head to the contralateral side. On examination, ipsilateral head tilt will

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exaggerate the strabismus (usually characterized by upward and outward deviation) and symptoms often abate upon contralateral head tilt. Approximately 90% of patients with an isolated ischemic CN IV palsy, as with our patient, will experience complete and spontaneous resolution within weeks to months.<sup>3,4</sup> Imaging is not indicated for cases of isolated fourth nerve palsies and patients can safely be referred to ophthalmology.<sup>1</sup>

#### CONFLICTS OF INTEREST

The authors have no conflict of interest to disclose.

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#### REFERENCES

1. Margolin E, Lam CTY. Approach to a patient with diplopia in the emergency department. *J Emerg Med.* 2018;54(6):799-806.
2. Dosunmu EO, Hatt SR, Leske DA, Hodge DO, Holmes JM. Incidence and etiology of presumed fourth cranial nerve palsy: a population-based Study. *Am J Ophthalmol.* 2018;185:110-114.
3. Hata M, Miyamoto K, Nakagawa S, Horii T, Yoshimura N. Horizontal deviation as diagnostic and prognostic values in isolated fourth nerve palsy. *Br J Ophthalmol.* 2013;97(2):180-183.
4. Khaier A, Dawson E, Lee J. Clinical course and characteristics of acute presentation of fourth nerve paresis. *J Pediatr Ophthalmol Strabismus.* 2012;49(6):366-369.

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