CASE REPORT

A Rare Case of Penetrating Trauma Resulting in Isolated Third Nerve Palsy

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ABSTRACT

A 23-year-old male presented to the emergency department with right eye pain, right upper eyelid ptosis, blurry vision, and binocular diplopia that developed immediately after he bent over in a parking lot and the antenna of a car penetrated his right upper eyelid. An extensive workup was performed, and he was found to have an isolated traumatic oculomotor nerve palsy with pupil involvement. No other ocular findings of a traumatic injury were present. The patient was observed for 14 months, during which he continually improved, with almost complete resolution of his diplopia, anisocoria, and ptosis.

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Introduction

Isolated oculomotor nerve palsy (ONP) due to trauma is not common. Solomon et al. reported isolated ONP in 1.2% of 2100 patients with direct head trauma.¹ Memon and Paine found a similar percentage of 1.1% in direct head trauma cases.² Of patients with ONP of all aetiologies, 15% to 25% are due to trauma.^{3–7} The trauma is most commonly in the context of a motor vehicle accident and involves forces that avulse the root of the oculomotor nerve from where it exits the brainstem.⁸ Direct penetrating injuries causing isolated ONP are much rarer, with just one previously found case report involving a shrapnel injury.⁹ We report a case of a penetrating trauma by a car antenna causing an isolated ONP. To our knowledge, this is the first case of isolated ONP resulting from a penetrating stab wound to the orbit.

Case report

A 23-year-old automobile insurance adjuster with no significant past medical or ocular history presented to the emergency department after bending over and having a car antennae strike him in the right upper eyelid. He was diagnosed with traumatic mydriasis and sent to the ophthalmology clinic for further evaluation.

On presentation, the patient complained of right eye pain, blurry vision, drooping of his right upper eyelid, and double vision. On examination, his best-corrected visual acuity was 20/70 in his right eye and 20/20 in the left eye. A small skin abrasion and scab were noted on the nasal aspect of the upper lid from which the patient denied any bleeding at the time of injury. The right upper eyelid had complete ptosis (Figure 1). Examination of the extraocular movements revealed absence of adduction, supraduction, and infraduction of the right eye. Motility of the left eye was normal. The right pupil was 5 mm, minimally reactive and irregular. The left pupil was 4 mm and briskly reactive to 2 mm. No relative afferent pupillary defect was present in either eye. Confrontation visual fields were full for each eye. Intraocular pressure was normal at 15 mm Hg in each eye. Slit-lamp examination of the right eye revealed a small subconjunctival haemorrhage nasally and was otherwise within normal limits with a clear crystalline lens on the right and left eyes. The right and left eyes had normal posterior segment examinations.

Computed tomography angiography (CTA) was performed to rule out an intracerebral aneurysm due to a relatively mild history of trauma and an

Figure 1. Day 0, status post initial injury showing a complete pupil involving oculomotor nerve palsy.

apparent pupil involving ONP. No such aneurysm was discovered. However, there was still no definitive answer as to how the reported mild trauma had resulted in a traumatic pupil involving ONP. Therefore, on the following day, magnetic resonance imaging (MRI) with and without contrast was performed and showed mild right retrobulbar oedema consistent with the history of penetrating trauma into the orbit (**Figure 2**). The patient was diagnosed with a right traumatic oculomotor nerve palsy with

Figure 2. Magnetic resonance imaging of the right and left orbits showing mild right retrobulbar oedema with accompanying enhancement near the right optic nerve sheath without abnormality of the optic nerve.

pupil involvement secondary to the car antenna penetrating the orbit.

Over the subsequent two months, the patient returned for three regular monthly follow-up ocular examinations. During that period, the patient's diplopia gradually improved such that he only experienced diplopia in far supraduction. The right upper eyelid ptosis began to resolve. The anisocoria also gradually improved to where the difference in pupil size was 5 mm and briskly reactive to 3 mm on the right eye, and the left eye was 5 mm and briskly reactive to 2 mm.

Fourteen months after initial presentation, the patient presented to the ophthalmology clinic with almost complete resolution of his right upper eyelid ptosis. His margin reflex distance was 3 mm in the right eye and 4 mm in the left eye. His motility examination was nearly full, with only slight misalignment in far supraduction (**Figure 3**). The patient was no longer subjectively symptomatic from diplopia in any direction of gaze.

Figure 3. Fourteen months after, the right traumatic oculomotor nerve palsy showing near-complete resolution of the palsy.

Comments

Traumatic third nerve palsies are classically associated with skull and cervical spine fractures, as well as intracranial injuries. A detailed clinical examination and thorough imaging are necessary to rule out other possible causes that may carry additional morbidity and possibly mortality. CT and CTA are performed to assess for possible fractures, haematomas, and aneurysms. Further imaging with MRI is often required for more detailed images of the brainstem and oculomotor nerve that are not possible with CT.¹⁰ With such an unusual history and clinical picture presented in this patient, we did not expect to find evidence of other causes of oculomotor nerve palsy, and indeed it wasn't until the MRI images were obtained that evidence of an orbital trauma was discovered.

The prognosis of traumatic third nerve palsy is variable, depending on the degree of damage. Recovery is slow and often incomplete. In one study of 10 patients with traumatic oculomotor nerve palsy secondary to closed head trauma, Kuo et al. reported the rates of recovery for ptosis and external ophthalmoplegia were 100% and 60%, respectively.¹¹ In the same study, the authors treated the patients with 6 weeks of corticosteroids, although there is no additional literature to support this specific treatment. Although little can be done with persistent anisocoria, ptosis can be corrected with blepharoplasty and diplopia can also be corrected with extraocular muscle surgery. Adequate time should be allowed for spontaneous recovery of the oculomotor nerve palsy before surgery for ptosis, and diplopia considered as spontaneous recovery can extend up to 6–12 months.¹² While awaiting for spontaneous recovery, options to prevent disabling diplopia are patching the affected eye, wearing prism lenses, or injection of botulinum toxin into the lateral rectus.¹³

Our patient was fortunate to have almost complete recovery of oculomotor nerve function without intervention. His diplopia completely resolved subjectively; however, in far upgaze, there is still a small amount of residual diplopia. The initial anisocoria almost resolved, with only trace asymmetry in constriction to light between the two eyes, and only mild ptosis remained of the affected lid. The patient declined surgical intervention for the ptosis.

Our case is unique in that the orbital penetrating trauma affected almost no other tissue of the orbit or globe. Aside from the obvious oculomotor palsy on initial examination, only a small lid abrasion was discovered on ocular examination and it belied the true nature of the injury.

The authors sought and obtained permission from the patient for use of the photos in this presentation.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

References

- [1] Solomons DJ, Solomon JC, de Villiers D. Direct traumatic third nerve palsy. *S Afr Med J* 1980;58:109–111.
- [2] Memon MY, Pain KW. Direct injury of the oculomotor nerve in craniocerebral trauma. *J Neurosurg* 1971;35:461–464.
- [3] Muthu P, Pritty P. Mild head trauma with isolated third nerve palsy. *Emerg Med J* 2001;18:310–311.
- [4] Richards BW, Jones FR, Younge BR. Causes and prognosis in 4278 cases of paralysis of the oculomotor, trochlear and abducens cranial nerves. *Am J Ophthalmol* 1992;113:489–496.
- [5] Rucker CW. Paralysis of the third, fourth and sixth cranial nerves. *Am J Ophthalmol* 1958;46:787–794.
- [6] Keane JR. Third nerve palsy: analysis of 1400 personally-examined patients. *Can J Neurol Sci* 2010;37:662–670.
- [7] Tiffin PA, MacEwen CJ, Craig EA, Clayton G. Acquired palsy of the oculomotor, trochlear and abducens nerves. *Eye (Lond)* 1996;10:377–384.
- [8] Elston JS. Traumatic third nerve palsy. *Br J Ophthalmol* 1984;68:538–543.
- [9] Ulutas M, Seçer M. Shrapnel injury of isolated third cranial nerve. *J Neurol Surg Rep* 2014;75:e217–e219.
- [10] Ealmaan K, Chang H. Isolated oculomotor nerve palsy following minor head trauma: case illustration and review. *J Korean Neurosurg Soc* 2013;54:434–436.
- [11] Kuo LT, Huang APH, Yang CC, Tsai SY, Tu YK, Huang SH. Clinical outcome of mild head injury with isolated oculomotor nerve palsy. *J Neurotrauma* 2010; 27:1959–1964.
- [12] Bruce BB, Biousse V, Newman NJ. Third nerve palsies. *Semin Neurol* 2007;27:257–268.
- [13] Kaido T, Tanaka Y, Kanemoto Y, Katsuragi Y, Okura H. Traumatic oculomotor nerve palsy. *J Clin Neurosci* 2006;13:852–855.