Wrong side oculomotor nerve palsy

Introduction

This article presents a woman who was admitted to the authors' emergency department after suffering a head trauma while skiing. She had initially lost consciousness for a few minutes and, as she presented with left oculomotor nerve palsy, multimodal computed tomography and magnetic resonance imaging was performed. This revealed a clinically asymptomatic right internal carotid artery dissection as a relevant additional pathology, which had not been expected as the clinical presentation was on the contralateral side.

Discussion

Internal carotid artery dissection

Various degrees of head and neck trauma may be associated with internal carotid artery dissection. Intrinsic and/or extrinsic factors compromising integrity of the vessel wall can cause internal carotid artery dissection (Engelter et al, 2013). Intramural

Figure 1. The totally closed eyelid of the affected left eye.

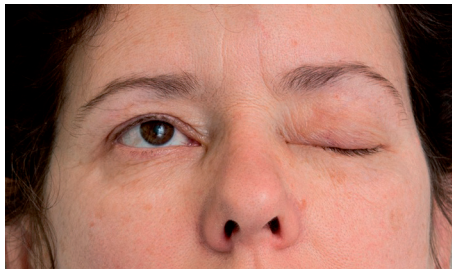
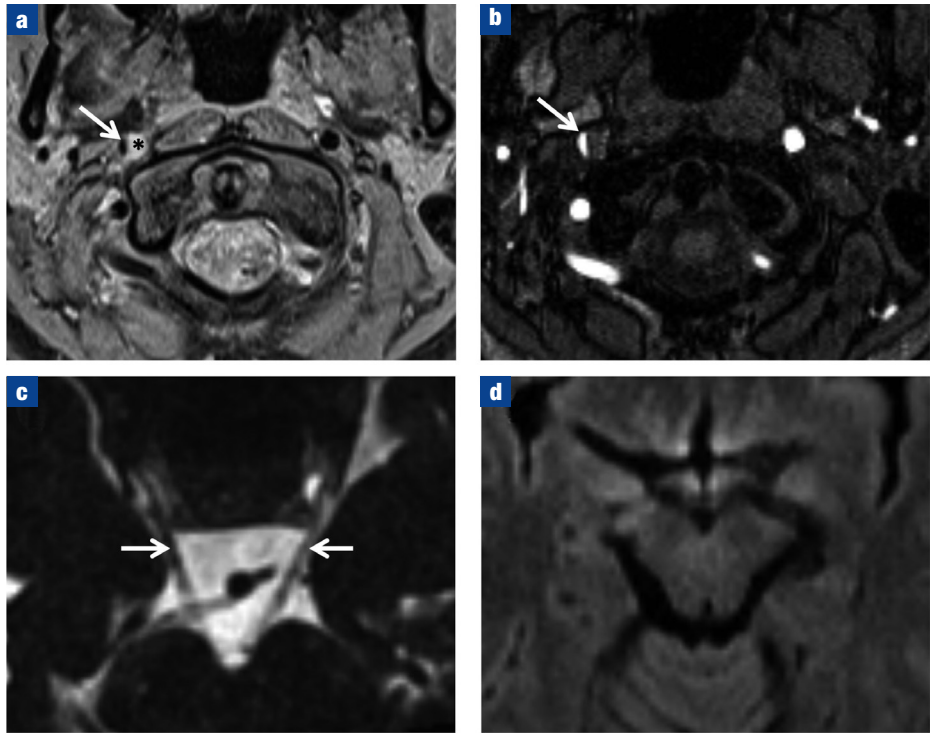


Figure 2. **a.** Axial T1-weighted fat-suppressed image and **(b)** time-of-flight magnetic resonance angiography show the right internal carotid artery dissection; the mural haematoma (**a** - asterisk) and the narrowed true lumen (white arrow). **c.** No pathology was noted along the oculomotor nerves (white arrows) as depicted on the heavy T2-weighted CISS (constructive interference in steady state) image. **d.** The diffusion-weighted images excluded recent ischaemia.



Dr Mirjam R Heldner is Neurologist in the Department of Neurology, Inselspital, University of Bern, Switzerland

Dr Marwan El-Koussy is Neuroradiologist in the Institute of Diagnostic and Interventional Neuroradiology, Inselspital, University of Bern, Switzerland

Professor Marcel Arnold is Neurologist in the Department of Neurology, Inselspital, University of Bern, Switzerland

Dr Simon Jung is Neurologist in the Department of Neurology and the Institute of Diagnostic and Interventional Neuroradiology, Inselspital, University of Bern, CH-3010 Bern, Switzerland

Correspondence to: Dr S Jung (simon.jung@insel.ch)

CASE REPORT

A 50-year-old woman lost consciousness for a few minutes as a result of a head trauma while skiing, which caused a mild headache. After coming round she could not open her left eye, her left pupil was dilated and unreactive, and her eye position was down- and outward – signs of left oculomotor nerve palsy (*Figure 1*). She was transferred to the authors' emergency unit.

Body computed tomography scan ruled out relevant trauma. Multimodal computed tomography and magnetic resonance imaging did not show visible compression of the oculomotor nerve or subarachnoid haemorrhage. However, it revealed a clinically asymptomatic right internal carotid artery dissection (*Figure 2*). Neurovascular sonography was also performed, demonstrating the internal carotid artery dissection causing a cervical high-grade stenosis. Anticoagulation was initiated as primary stroke prevention.

During hospitalization, clinical findings remained stable, transient ischaemic attacks did not occur and control magnetic resonance imaging on day 7 did not show new changes, especially no silent ischaemia. On day 8 the patient was discharged home. One year later, the right internal carotid artery was recanalized and the traumatic left oculomotor nerve palsy partially recovered. A surgical intervention was initiated because of disabling diplopia.

haematoma occurs, causing stenosis, occlusion or pseudoaneurysm.

With regard to clinical features, head or neck pain is frequently seen, Horner's syndrome and tinnitus in around 25% of cases, and rarely ipsilateral cranial neuropathies as ipsilateral oculomotor nerve palsy (Nizam et al, 2011). Transient ischaemic attack or stroke occur in >50% of cases (Lee et al, 2006). If present, combined symptoms may indicate internal carotid artery dissection.

The diagnosis is made by neurovascular imaging. Multimodal computed tomography and magnetic resonance imaging show luminal or arterial wall abnormalities and expansion, intramural haematoma and surrounding structures. Digital subtraction angiography is invasive, but can illustrate typical signs of internal carotid artery dissection such as intimal flap, double lumen, string sign and tapered stenosis or occlusion. Carotid duplex can evaluate haemodynamic parameters but has lower sensitivity, especially if internal carotid artery dissection is located near the skull base (Jauch et al, 2013; Kernan et al, 2014).

Data are limited on optimal treatment. For patients with no ischaemic symptoms as in this patient, timely primary stroke prevention should be initiated (evidence grade 2C) with antiplatelets or anticoagulation, followed by routine clinical examination and neurovascular imaging to see the evolution and adjust treatment (Jauch et al, 2013; Kernan et al, 2014).

Oculomotor nerve palsy

Lesions anywhere on the path between the oculomotor nerve nuclei in the midbrain, the fascicular course within the brainstem, the subarachnoid space, the margin of the tentorium, the cavernous sinus and the orbit lead to oculomotor nerve palsy. If it is complete and pupil-involving, patients have ptosis, a large unreactive pupil, paralysis of eye adduction, elevation and depression. The eye rests in a down- and outward position.

Causes vary according to the degree and presence of (non)-pupil-sparing pattern of nerve involvement, associated symptoms, age and historical features such as trauma.

After head trauma, a complete and pupil-involving pattern may present, if loss of consciousness (as in this patient) and/or skull fracture occurred. If not, prompt neuroimaging should be performed, particularly to search for subarachnoid haemorrhage. The use of digital subtraction angiography should be considered on a patient-by-patient basis.

Head trauma damages the oculomotor nerve by compression, deformation, rootlet avulsion, distal fascicular damage and/or defective blood supply.

Traumatic oculomotor nerve palsy, especially if incomplete, may recover spontaneously. Deficits still present after 6 months are generally persistent and surgical interventions may be required to alleviate disabling diplopia and/or ptosis (Bruce et al, 2007). **BJHM**

The authors would like to thank Professor Heinrich P Mattle, Neurologist, Professor Urs Fischer, Neurologist, and Professor Claudio L Bassetti, Neurologist, in the Department of Neurology, Inselspital, University of Bern, Switzerland, for their support.

LEARNING POINTS

- Clinicians should perform neurovascular imaging in the emergency department in a patient with loss of consciousness and oculomotor nerve palsy after head trauma.
- In case of detected internal carotid artery dissection, primary stroke prevention should be initiated.

Bruce BB, Biousse V, Newmann NJ (2007) Third nerve palsies. *Semin Neurol* **27**(3): 257–68 (doi: 10.1055/s-2007-979681)

Engelter ST, Grond-Ginsbach C, Metso TM et al (2013) Cervical artery dissection: trauma and other potential mechanical trigger events. *Neurology* **80**(21): 1950–7 (doi: 10.1212/WNL.0b013e318293e2eb)

Jauch EC, Saver JL, Adams HP Jr et al; American Heart Association Stroke Council; Council on Cardiovascular Nursing; Council on Peripheral Vascular Disease; Council on Clinical Cardiology (2013) Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* **44**(3): 870–947 (doi: 10.1161/STR.0b013e318284056a)

Kernan WN, Ovbiagele B, Black HR et al; American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Peripheral Vascular Disease (2014) Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* **45**(7): 2160–236 (doi: 10.1161/STR.0000000000000024)

Lee VH, Brown RD Jr, Mandrekar JN, Mokri B (2006) Incidence and outcome of cervical artery dissection: a population-based study. *Neurology* **67**(19): 1809–12 (doi: 10.1212/01.wnl.0000244486.30455.71)

Nizam A, Yacoub HA, McKinney JS (2011) Internal carotid artery dissection heralded by an oculomotor nerve palsy: case report and literature review. *Neurologist* **17**(6): 333–7 (doi: 10.1097/NRL.0b013e318218030a)