Hypertrophic olivary degeneration secondary to traumatic brain injury: a unique form of trans-synaptic degeneration

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Accepted 11 June 2015

DESCRIPTION

A 33-year-old man with a history of traumatic brain injury (TBI) from a few years prior, secondary to a high-speed motor vehicle accident, presented with worsening right-sided motor function. Brain MRI showed diffuse axonal injury, punctuate microbleedings, asymmetric Wallerian degeneration along the left corticospinal tract in the brainstem and

haemorrhagic left superior cerebellar peduncle, all consistent with his prior TBI. Moreover, the right inferior olivary nucleus was enlarged, which is exemplified in unilateral right hypertrophic olivary degeneration (HOD), likely secondary to the haemorrhagic lesion within the left superior cerebellar peduncle, causing secondary degeneration of the contralateral corticospinal tracts (figures 1–6).

Figure 1 Brain axial fluid-attenuated inversion recovery MRI showing hypertrophy of the right inferior olivary nucleus.

Figure 3 Brain axial gradient echo MRI showing haemosiderin products in the left superior cerebellar peduncle.

Figure 2 Brain axial T2 MRI showing increased T2 signal change and hypertrophy of the right inferior olivary nucleus.

Figure 4 Brain axial gradient echo MRI showing evidence of haemosiderin products in the left-right midbrain, cerebral peduncles and temporal lobes.

To cite: Mehrzad R, Ho MG. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2015-210334

Figure 5 Brain axial gradient echo MRI sequence showing severe microhaemorrhages throughout the body of the corpus callosum.

Figure 6 Brain axial gradient echo MRI showing hemosiderin products in the cortical/subcortical regions of bilateral frontal and parietal lobes.

HOD is a very rare form of trans-synaptic degeneration that occurs over a long period of time when a lesion interrupts the triangle of Guillain-Mollaret.¹ Damage to either the anterior spinocerebellar tracts or cerebellar efferences, which mainly run from the dentate nucleus via the superior cerebellar peduncle to the red nucleus and thalamus (dentatorubral tract), may explain our patient's marked cerebellar syndrome. The dentatorubral tract constitutes one component of the triangle of Guillain-Mollaret, which is a functional neuronal network arranged in a feedback loop encompassing the cerebellum including the dentate nucleus, red nucleus and the inferior olivary nucleus. Fibres run from the dentate nucleus via the dentatorubral tract within the superior cerebellar peduncle to the contralateral red nucleus. Fibres from the red nucleus project to the inferior olive via the central tegmental tract, and from there, olivocerebellar fibres run via the inferior cerebellar peduncle to the contralateral cerebellar cortex, which projects to the dentate nucleus.²

Learning points

- ▶ Hypertrophic olivary degeneration is a very rare form of trans-synaptic degeneration that occurs over a long period of time when a lesion interrupts the triangle of Guillain-Mollaret.
- ▶ Haemorrhagic lesion within the left superior cerebellar peduncle causes secondary degeneration of the contralateral corticospinal tracts, which causes this unique finding.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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