

BILATERAL OLIVARY HYPERTROPHY AFTER UNILATERAL CEREBELLAR INFARCTION

Case report

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ABSTRACT - We describe a case of bilateral olivary hypertrophy and palatal tremor after unilateral cerebellar infarction. Hypertrophic olivary degeneration (HOD) is associated with hypersignal in the inferior olivary nucleus (ION), on T2-weighted images. HOD has been more often observed ipsilaterally to a central tegmentum tract lesion or contralaterally to a dentate nucleus or a superior cerebellar peduncle lesion. Double innervation of each ION from either dentate nucleus may have underlied the imaging and clinical findings in this 63 year-old male patient.

KEY WORDS: hypertrophic olivary degeneration, palatal tremor, cerebellar infarction, denervation supersensitivity.

Hipertrofia olivar bilateral após infarto cerebelar unilateral: relato de caso

RESUMO - Relatamos um caso de hipertrofia olivar bilateral e tremor cerebelar após infarto cerebelar unilateral. A degeneração olivar hipertrófica (DOH) é associada ao aumento de sinal no núcleo olivar inferior (NOI), em sequências pesadas em T2. A DOH tem sido mais frequentemente observada ipsilateralmente a lesões do trato tegmentar central ou contralateralmente a lesões do núcleo dentado ou do pedúnculo cerebelar superior. A inervação bilateral de cada NOI por ambos os núcleos dentados pode ter sido responsável pelas características clínicas e radiológicas neste paciente de 63 anos.

PALAVRAS-CHAVE: degeneração olivar hipertrófica, tremor de palato, infarto cerebelar, hipersensibilidade por denervação.

Hypertrophic olivary degeneration (HOD) is a particular kind of transsynaptic degeneration that occurs after lesions of the dentato-olivary pathway. On T2-weighted images, the affected olive is typically increased in size and shows a hyperintense signal. Usually, unilateral HOD is observed ipsilaterally to a central tegmentum tract (CTT) lesion or contralaterally to a dentate nucleus (DN) or a superior cerebellar peduncle (SCP) lesion¹. We report a case of bilateral HOD after unilateral cerebellar infarction.

CASE

A 63-year-old man with a history of smoking had sudden onset of dysarthria, ataxia, and diplopia. Months later,

the patient presented dyspnea and family members noticed "clicks" that seemed to originate in his mouth. One year later, he presented sudden slight left hemiparesis. Two years later, he was evaluated in our Neurology Clinic. The patient was normotense, overweight, presented digital clubbing in both hands, skin thickening in both feet, and uvula hypertrophy. The neurological exam revealed a cerebellar syndrome with gait ataxia, right arm and leg incoordination, and a slurred speech. Bilateral palatal tremor was observed. There were slight right hand weakness, slight left hemiparesis and lower limb spasticity. Deep tendon reflexes were normal. The patient presented tactile and pain plantar hypoesthesia, and complained of pain and paresthesias in both feet. A skew deviation was observed, with the right eye lower than the

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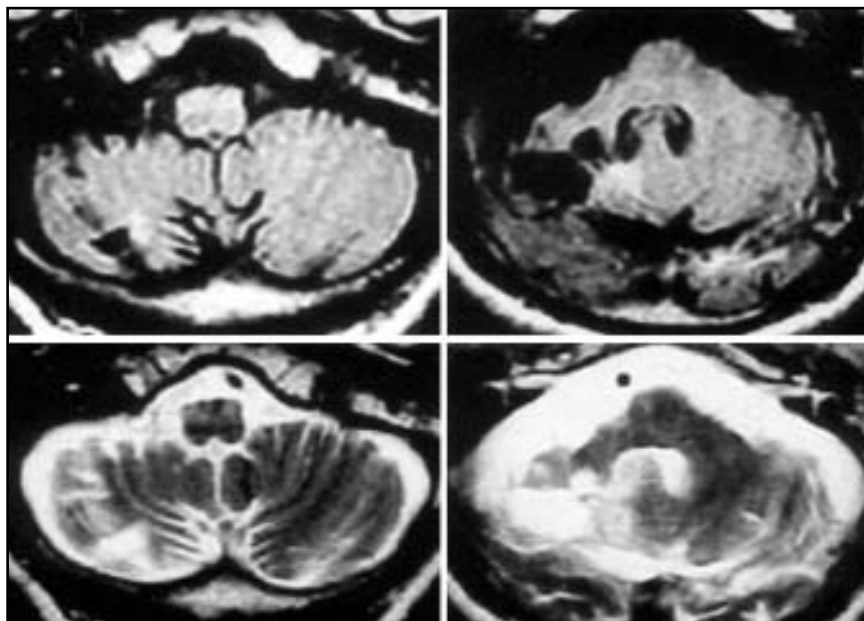


Fig 1. FLAIR (top; TR = 8402 ms; TE = 142 ms) and T2-weighted (bottom; TR = 4500 ms; TE = 99.9 ms) images performed two years after the cerebellar infarction disclose: involvement of the right cerebellar hemisphere including the dentate nucleus (right); ipsilateral volumetric reduction of the right brachium pontis and pontine tegmentum (right); bilateral olivary hypertrophy with increased signal on T2-weighted image (left).

left. Saccadic eye movements were hypometric. The gag reflex was normal bilaterally. Laryngoscopy revealed bilateral cyclical laryngeal spasms, with rhythmic bilateral vocal cord adduction. No other cranial nerve abnormalities were present. Brain MRI at 1.5 T revealed a right cerebellar hemisphere infarction and bilateral olivary hypertrophy (Fig 1). In addition, a left occipital and a left frontal infarction were observed, as well as multiple small deep white matter lesions, hyperintense on T2-weighted and FLAIR images, in both cerebral hemispheres. Digital subtraction angiography (DSA) revealed diffuse mural irregularities and moderate stenosis in the basilar artery, and right vertebral artery (VA) occlusion at its origin. A transesophageal echocardiogram was normal. Laboratory results revealed hypertriglyceridemia, hypercholesterolemia, increased erythrocyte sedimentation rate (55 mm/hour), eosinophilia, positive anti-RNP antibodies (1/640) and increased polyclonal gammaglobulin content (2.35 mg/dl). Cerebrospinal fluid analysis also showed increased gammaglobulin content (17.5%). Electroneuromyography demonstrated a chronic sensorimotor demyelinating polyneuropathy affecting the lower limbs. Microangiopathic changes without vasculitic features were present in sural nerve biopsy. The right cerebellar infarction was attributed to right VA occlusion and consequent involvement of the right posterior inferior cerebellar artery territory in the cerebellum, in a patient with diffuse vasculopathy caused by atherosclerosis or vasculitis. The patient gave informed consent for the publication of this report.

DISCUSSION

The Guillain-Mollaret triangle (Fig 2) is composed of the ipsilateral inferior olivary nucleus (ION) in the medulla, the contralateral DN in the cerebellum, and the red nucleus (RN)¹⁻⁸. Fibers from the ION project to the contralateral cerebellar cortex through the olivocerebellar tract via the inferior cerebellar peduncle (ICP) and then to the DN. Dentate fibers enter the SCP and cross the midline in the decussation of the brachium conjunctivum, in the vicinity of the red nucleus (RN) before descending to the ipsilateral ION through the CTT. Lesions affecting the contralateral DN or SCP, or the ipsilat-

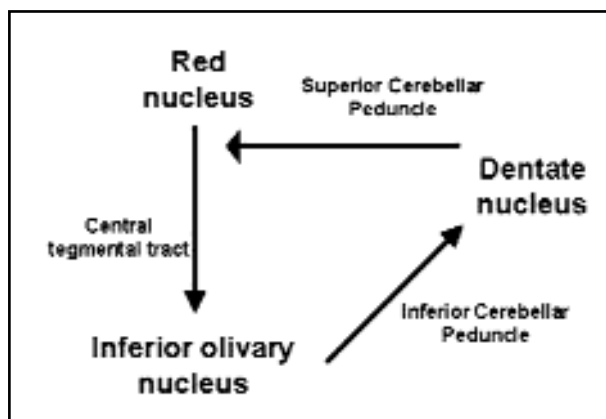


Fig 2. Schematic representation of the Guillain-Mollaret triangle.

eral CTT are associated with deafferentation of the ipsilateral ION^{3,9}. ION deafferentation may cause supersensitivity denervation and HOD². HOD is histologically characterized by neuronal vacuolation and swelling, gliosis and demyelination in the ION^{1,6,7}. The process may follow not only vascular but also neoplastic, inflammatory, infectious and degenerative lesions affecting the dentato-olivary pathway^{1,2,7,8}. In autopsied patients with cerebrovascular lesions of the dentate-olivary tracts, neuronal hypertrophy was initially observed 20-30 days after the onset of the causative lesions and was maximal 6-7 months later^{10,11}. Three or four years later⁴, HOD is substituted by olivary atrophy^{1,7}.

MRI has been shown to correlate with pathologic descriptions of HOD. Increased signal intensity on T2-weighted images in the ION has been reported one month after cerebellar and/or brainstem infarctions, probably reflecting gliosis and increased water content^{1,3}. ION enlargement may resolve in 10-16 months but the increase in signal on T2-weighted images may still be seen years later³. Differential diagnosis of the increase in signal observed in the medulla include tumoral, demyelinating, vascular and inflammatory lesions. Increase in ION size, lack of involvement of medullary structures other than the ION and lack of contrast enhancement favor a diagnosis of HOD^{3,8}. The presence of a contralateral cerebellar lesion or an ipsilateral pontine lesion further supports the diagnosis³.

Palatal tremor, previously known as palatal myoclonus, consists of continuous rhythmic jerks of the soft palate and sometimes of other brainstem or spinal-innervated muscles^{2-4,7,12}. Laryngeal involvement, as in our patient, with associated dysphonia and dyspnea have been rarely described⁴. Symptomatic palatal tremor (SPT) is due to a focal lesion within the dentato-olivary pathway while in essential palatal tremor (EPT) no etiologies are identified⁴. Unilateral or bilateral SPT have been reported in association with contralateral HOD¹², and bilateral SPT in association with bilateral HOD^{2-4,7}. Different pathogenetic mechanisms have been proposed to explain how HOD leads to SPT^{4,5,10,12}. In seven of eight patients who had presented SPT after cerebrovascular lesions of the dentate-olivary pathway, SPT occurred 1-2 months after the causative injury, and was maximal 1-2 years later¹⁰. Correlations between clinical presentation and histopathological findings revealed that SPT appeared just after the onset of HOD changes, and was maximal soon after their peak. Spontaneous, rhythmic firing

of the deafferented inferior olives due to disinhibition¹⁰ might rhythmically stimulate the contralateral dentate to lower motor neuron projections⁴, therefore producing SPT. Alternatively, the dentato-olivary pathway might become unable to inhibit cranial nerve motor nuclei firing^{6,10}. Maintenance of SPT after substitution of HOD by atrophy has been reported^{6,10}, suggesting long-term deficiency in modulation of motor nuclei firing due to olivary dysfunction. This dysfunction may accompany olivary atrophy as well as hypertrophy.

After cerebellar lesions, HOD is usually contralateral to the affected DN². Bilateral lesions affecting both CTTs, or one CTT and the contralateral SCP have been associated with bilateral HOD^{3,9,10}. Reports of bilateral HOD and SPT after unilateral cerebellar lesions, as in the present case, have been rare in the literature^{1,7,10}. It has been suggested that supratentorial lesions causing interruption of other pathways that might also modulate olivary function could rarely lead to HOD⁷. Our patient had multiple asymptomatic white matter lesions in both cerebral hemispheres and we cannot completely exclude this hypothesis. However, double innervation of each ION from either DN may have more likely underlied bilateral HOD in this case since the clinical manifestation, SPT, was observed after a symptomatic unilateral cerebellar infarction⁷.

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